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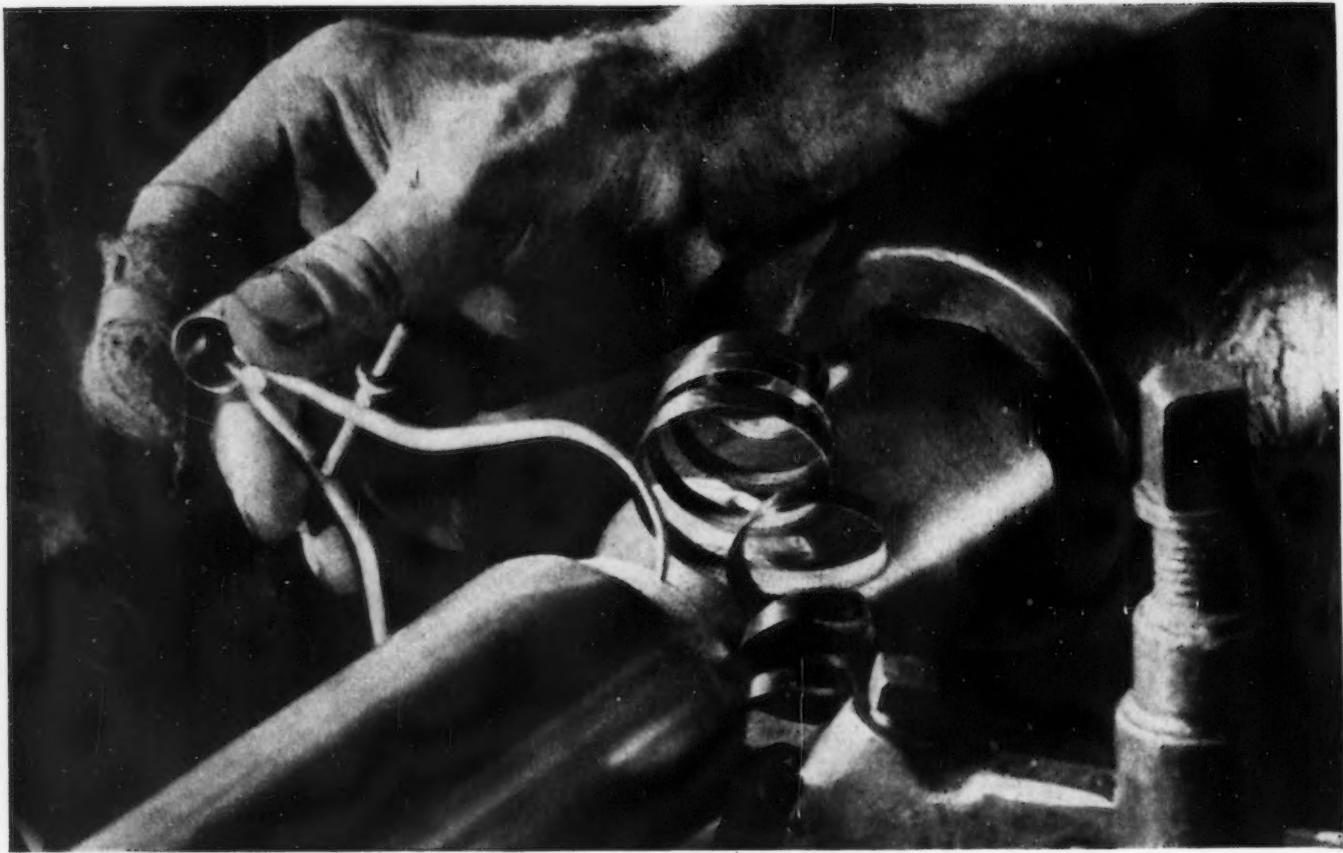
THE IRON AGE

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Certified Steels Help Lower Labor Costs

Labor costs, rapidly becoming today's No. 1 consideration, are in a measure dependent on materials. On most jobs where steel is used, shop costs are the largest and most variable single factor. While the cost of steel itself is relatively small, the quality plays a very important part in the control of these shop labor costs. If it is hard to fabricate—does not work uniformly—has hard spots to dull or break tools—or in the case of alloys, does not respond properly to heat treat-

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... THE IRON AGE ...

APRIL 13, 1939

ESTABLISHED 1855

Vol. 143, No. 15

The Break-Even Point for Employment

EVERY executive knows about the break-even point for profits. It is that point in volume at which the seesaw of profit and loss is exactly balanced. Add a little more volume and the profit side of the seesaw rises rapidly. Subtract a little volume and the profit side dips and the loss side soars in the air.

It is a critical point for a business. Most American concerns are hovering thereabouts at the present moment. That means insomnia for the management and a nightmare for the stockholders.

Profits as well as losses are greatest, per unit of volume, at or near the break-even point. We have seen how it works in the steel industry. We have seen a company—many of them in fact—dip hundreds of thousands of dollars in the red in one quarter and emerge as many hundreds of thousands in black the next. Such is the magic of the break-even point.

It appears that there is a similar break-even point for employment in American private enterprise. But it does not work quite the same way.

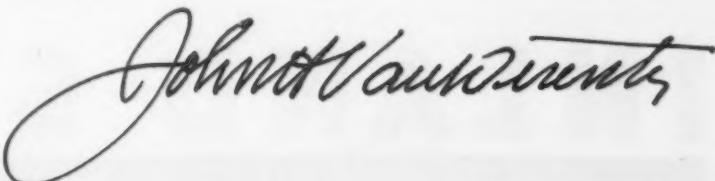
The downswing of the employment seesaw, during a depression, or recession, or whatever name you may have for a poor business period, is cushioned. It is cushioned by spreading the work, by working fewer days per week or fewer hours per day, or alternating shifts. Thus the number of unemployed does not increase so fast as it would if, under such circumstances, people were discharged and a smaller number kept to work full time.

No one questions the social advantages of this policy. It spreads wages as far as possible in bad times. But it also has a dampening effect on the upswing.

When business begins to go up, as we emerge from a recession, men are not transferred from the ranks of the unemployed to the ranks of the employed in proportion to the gain in business volume, as would be necessary if the downswing had not been cushioned. There is slack to be taken up before more people are put on the payroll. People who have been working for two days a week, for example, begin to work four or five days.

Thus, it takes time to reach the break-even point where national unemployment begins to be affected by a business rise. The slack must be taken up first.

We have had an approximate 25 per cent increase in the level of business as a whole in the last twelve months. Yet the number of unemployed has not decreased perceptibly. That is not an indictment of private enterprise nor should it discourage future hopes for private reemployment. It is simply an indication of the fact that we have not yet reached the break-even point.





"Soft as Steel!"

"Hard as steel" is a more common phrase. But he lacks imagination, if not also experience, who thinks only of steel's hardness. Today's streamlined designs and production economies, too, are made possible by steel's softness, its ease of forming.

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understands your problems. By working *with you*, he makes steel work *for you* to better advantage.

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SHEETS STRIP TIN PLATE BARS PLATES FLOOR PLATES STRUCTURALS PILING RAILS TRACK ACCESSORIES REINFORCING BARS



*Look the
Man
Who Runs One*

ONE of the reasons why today's automobiles are so satisfactory to the average user is that he, himself, has helped to design them. Every major automobile company has some means of determining the consumer's reaction to different automobile features and uses this information to help determine what design improvements to make. This does not mean that automotive engineers are not capable of designing a machine which, to them, is the last word. It does show, however, that sometimes the designer, the man who knows a great deal about this subject, has different ideas from the fellow who actually runs the automobile.

As builders of turret lathes, our company has recognized that the operator could tell us a lot about building turret lathes. For a number of years a system has been maintained whereby these suggestions and complaints were brought to the design committee for action. There always existed the question, however, as to whether the suggestions we were getting were a representative sample. We often wondered if we should get more helpful and more frank suggestions if we asked for an anonymous reply.

To find out, we recently sent a questionnaire to operators of turret lathes. We asked them about the operation of a turret lathe, exactly as an auto-

• • •
By PHILIP E. BLISS
*President, The Warner & Swasey Co.,
Cleveland*

• • •
mobile company might ask the driver about the operation of the car. We wanted to know what they liked and didn't like about the machine they operated.

Extremely interesting and illuminating replies were received. While many of the questions had to do with subjects too specific to be of wide interest, the significance of the replies to some questions, it seemed to us, would be of value to all industrialists.

What impressed us most about the replies were the quantity and quality of the suggestions made by these operators. Although in some cases there was some difficulty in finding words to express their thoughts, ordinarily their replies were put in good, straightforward English. In almost every case, their suggestions were very intelligent ones. They did not ask for impossible things. They knew what they wanted, and they told us exactly what that was.

Of course, many of the suggestions

covered ground that our engineering department has been working over for years, and so far as we know, no living man has discovered the complete answer to the problem. Some new details have been brought up, however, which are worthy of serious thought, and our engineering department is working on these suggestions.

In going over the replies, we wondered whether buyers of shop machinery talked with the operator about shop problems often enough. It was apparent that an operator was not fooled on gadgets, that is features that have a selling appeal, but little or no real value. When a new piece of machinery is proposed, the operator could probably be very helpful in forecasting whether extra machine features would be worth their cost or whether a standard machine would produce just as well.

Operators stressed the importance of having controls in the right place. In this respect they are no different from automobile drivers. The automobile driver likes his steering wheel, clutch, brake lever, accelerator and gear shift lever all within easy reach. So does the machine operator. He is quite pleased, therefore, when a manufacturer anticipates his desire and places all operating controls within arm's reach.

Since ease of operation was one of the most important points stressed by operators, this is a basic necessity for efficient machine tool construction. After all, if we build a machine with great productive ability and then fail to allow for the human desire to do things as easily as possible, our machine will not produce as much as it should.

Now, let us see what an operator would do if he were buying a turret lathe. We asked him, "What is the most important requirement in buying a turret lathe?" The answer receiving first place may surprise you. It was accuracy. Reliability came second, and ease of operation third.

While ease of operation may be uppermost in the operator's mind from his own personal standpoint, accuracy—or to be more specific, the ease with which accuracy is obtained—seemed to the operator the all-important thing from the owner's standpoint. This is significant because it shows that operators can and do think in terms of net results. It bares their desire to solve a problem that is present in practically every shop, namely, to turn out a better product. If the machine produces accurate work easily, this means that the man will get some personal credit because, after all, accurate work means less trouble in succeeding operations and lower cost of assembly, as well as a better product. The operator, then, thinks that the owner should look for a ma-

chine that is accurate and stays accurate.

We asked the operators, "Why is it hard to get good results?" Away out in first place was the answer, "Not enough tools."

This is significant because the answer the operators give is exactly the same answer as would be given by our own company engineers and probably by machine tool manufacturers in general. Concerns spend thousands of dollars for new equipment because it has proved that it will pay for itself over a short period of time. If they would keep their new and old machines provided with the proper tooling and attachments, they would find additional and very large savings to be available.

The operators understand this situation because they run the machines. They know how much easier and more rapidly a job can be done if the right tools are at hand. Asking each operator what he needs to do a special job will often show how a \$50 or \$100 expenditure will pay for itself out of a few weeks' savings. Here again, the operator can help by making valuable suggestions.

Here is another interesting sidelight on this questionnaire—the number of years experience of the thousand or more operators answering the questions. Two and one-half per cent had run turret lathes less than one year, 32.6 per cent one to

five years, 18.3 per cent six to ten years and 46.6 per cent over 10 years.

These figures tell their own story. There is, potentially at least, a shortage of trained operators in this field. These figures indicate how few men were taken into industry during the worst of the depression period. They show that since the depression period not enough new men have been trained.

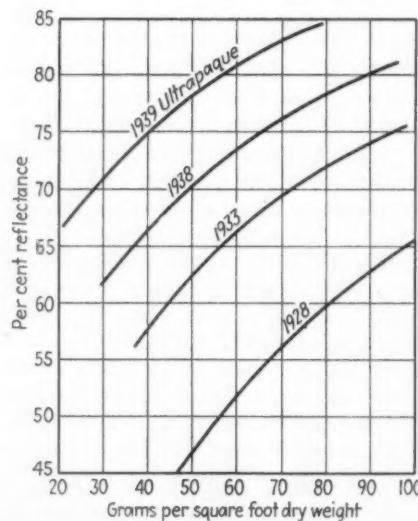
The men who have operated turret lathes over 10 years are probably the best operators in the world. We have certainly found that age is no deterrent to first-class workmanship just as long as physical health remains. After all, however, time does march on and every year additional mechanics must be trained to fill the shoes of those who must inevitably lay down their tools. Industry has not adequately trained new men during the past 10 years. This remains a problem that must be faced some day, when, with better business, a shortage of workers is certain to come.

The more we see of skilled machine operators, both in our plant and in those of our customers, the more impressed we are with them as a group. The results of this questionnaire only served to bolster our belief in their ability. These men may not be aware of all the considerations to be thought of at the time a machine tool is purchased; but they certainly can contribute ideas that will help you make the proper decision.

Ultra-Opaque Porcelain Enamels

A NEW development resulting in greatly increased opacity for porcelain enamel finishes has been announced by the Ferro Enamel Corp., Cleveland.

Applied in a coating said to be 40 per cent thinner than that required with the most opaque of last year's porcelain enamels, the new ultra-opaque enamels have a covering power or measured opacity equal to that of the 1938 finishes. Investigations with a high-power microscope have shown that a 72 per cent opacity reading, which required 246 gm. of cover coat enamel per sq. ft. of surface only ten years ago, now can be obtained with Ultrapaque at only 32 gm. per sq. ft.—a reduction of 87 per cent in ap-



plication weight. The weight-reflection curves for sheet steel cover coats, shown in the accompanying illustration, demonstrate this progressively improving covering power of enamels.

Besides a saving of 40 per cent in cover coat requirements, compared with last year's needs, the advantages claimed are greatly increased resistance to mechanical shock and deflections, greater resistance to scratching, practical elimination of chipping, and the production of enameled sheets that shear neatly with no chipping back from the edges.

Ultrapaque enamel frit is supplied to the enameler in powdered form, pre-ground so that 90 per cent of it

(CONCLUDED ON PAGE 80)

ATTEMPTS to eliminate the aerodynamical "drag" of thousands of projecting, brazier rivets in aircraft fuselages led to the development of the flush head rivet and at the same time created a production problem relating to tooling and costs. It has been successfully solved after considerable research in the plant of the Curtiss Aeroplane Division. Rivet driving in airplanes is a tremendously important factor. It is estimated that the cost of driving each rivet under the old method averaged 5c. per rivet, which amounted to \$2,250 per ship of a typical example containing 45,000 rivets, of which 30,000 are external. In advance of the experiments to be described it was estimated that flush riveting might raise the cost to as much as 15c. per rivet, or \$6,750 per structure. Detailed time studies and estimates based thereon indicated, however, that the increase would be much less. (See Table I.) Through the development of new techniques and new tooling, however, the added cost for flush riveting is actually only about 30 per cent.

First point of attack of the problem was the method of countersinking the holes in the skin. Press countersinking is obviously faster than machine countersinking and is particularly applicable to aircraft fuselage work since only a small portion of the skin sheets ever exceed 0.051 in. in thickness. Press countersinking as first applied, however, was one of the contributing causes of the development of cracks around the edges of the holes in the second sheet. This cracking has been obviated by several changes in practice:

The first point of attack was the design of the rivet itself. It was the depth of head of the standard AN425 rivet that necessitated a large amount of deformation in the sheets and led to cracking of the hole edges when press countersinking was resorted to. Consideration was given to changing the angle of the head, but this modification was abandoned because as the

Abstracted from a paper presented by the author at the National Aeronautic Meeting of the Society of Automotive Engineers, held in Washington, March 16.

Production Phases

of Flush Riveting of Airplane Fuselages

By DON R. BERLIN

Chief Engineer, Curtiss Aeroplane Division, Curtiss-Wright Corp.

included angle of the head increases, the ratio of change in outside diameter of head with changes in depth tolerances becomes greatly amplified. Hence the 78-deg. included angle is retained, but the rivet head height has been reduced from 0.063 to 0.046 in., thereby reducing the head diameter from 0.226 to 0.200 in. See Fig. 1.

It was also found that cracks at the edges could be avoided by elimination of the redrilling operation in the second sheet. In the case of a $\frac{1}{8}$ -in. rivet, this means drilling directly to size with a No. 30 drill (0.1285 in.), whereas the earlier practice had been to first use a 0.094-in. drill, followed by redrilling with a No. 30 drill. Other contributing factors to successful press countersinking were:

(a) The development of suitable press countersinking die angles, Fig. 2, so that as the skin is formed it is also tapered toward the hole and consequently prevents serious enlargement of the hole which would be conducive to cracks.

(b) The chamfering of the inner edge of extrusion shapes and formed stringers prior to press countersinking; also chamfering the inner edge of the inner sheet.

(c) The use of linseed oil as a lubricant on press countersinking punches and dies. This oil was chosen because it does not interfere with subsequent painting operations.

Originally the flush rivet development program generally prescribed press countersinking of the sheets and inner members by means of slow hitting hammers. This procedure has been largely replaced by pneumatic squeezing, since this technique eliminated the general necessity of two-man teams to countersink, thus reducing the cost and improving the accuracy of the operation. In connection with this squeezing operation, it was found that a spring loaded stake, Fig. 3, was very helpful in that it prevented rivets from flashing between the sheets.

Proper selection of punch and die angles and diameters is also of importance in order to produce a forged condition with the sharp corners where the head seats on the outside of the skin. Otherwise in thin gage sheets a radius would result at this point, causing an unsightly gap around the rivet head and also bulging between sheets, a condition illustrated in Fig. 4. Punches and dies must have pol-

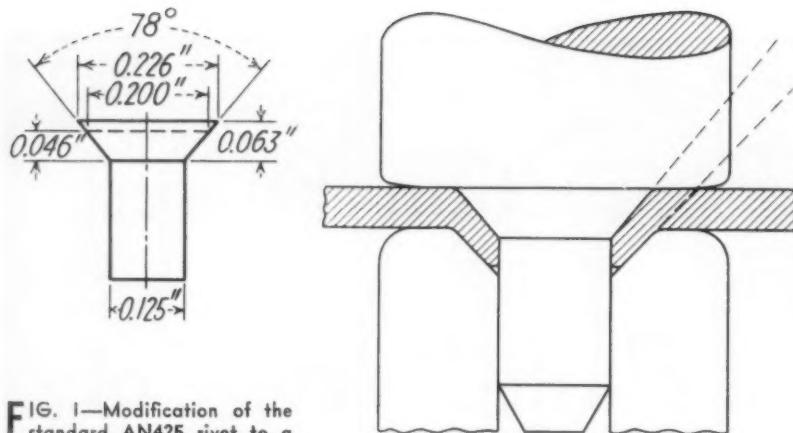


FIG. 1—Modification of the standard AN425 rivet to a reduced head height and head diameter is one of the factors in the successful application of this type of flush rivet in airplane fuselage construction.

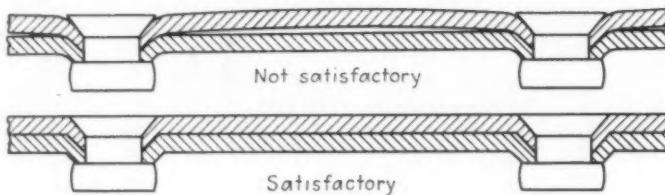


FIG. 4—Holes that are press countersunk in such a manner as to leave a radius around the edge of the hole gives an unsightly appearance and are likely to lead to bulging of the skin sheets between rivet holes. This condition is corrected by the selection of the proper die angles so as to actually forge the material to a sharp corner during press counter-sinking.

TABLE I—COMPARATIVE TIME STUDIES OF BRAZIER AND FLUSH RIVETING OPERATIONS

Brazier Riveting Operations—Actual	
	Minutes
a. Stack drill 0.094 in. per hole per sheet	0.055
b. Burr holes	0.05
c. Assemble skin to stringer with screws, one in five holes	0.19
d. Drill 0.094 in. through undrilled member	0.15
e. Redrill 0.1285 in.	0.06
f. Remove chips	0.01
g. Rivet (2 men)	0.49
	1.005
Flush Riveting Operations—Estimated (Machine Counter Sinking)	
	Minutes
a. Stack drill 0.094 in. per hole per sheet	0.055
b. Burr holes	0.05
c. Assemble skin to stringer with spring fastener 1 in 5 holes	0.19
d. Drill 0.094 in. through undrilled member	0.20
e. Redrill 0.1285 in.	0.06
f. Remove chips	0.01
g. Rivet (2 men)	0.49
h. Machine countersink	0.15
	1.205

ished surfaces and be accurate within close limits. Dies for press counter-sinking are formed by cold pressing under high pressure. Fig. 5 shows the master die parts and the countersinking dies. After machining, the crowned face is given a high polish. The blank is then assembled within

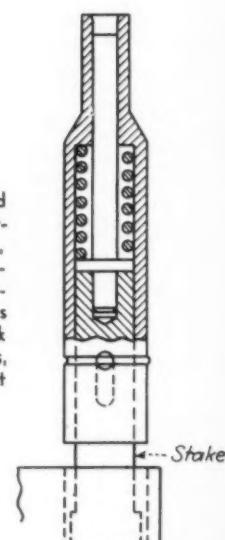
TABLE II
Best Riveting Practice With Latest Tooling

	Flush	Brazier
a. Stack drill (0.094 in.) per hole per sheet	0.055	0.055
b. Burr holes	0.05	0.05
c. Assemble skin to stringer with spring fasteners	0.15	0.15
e. Drill 0.1285 in.	0.15	0.15
i. Remove skin and press countersink	0.12	...
h. Machine countersink stringer	0.15	...
i. Reassemble skin and stringers	0.05	...
f. Remove chips	0.01	...
g. Rivet (multiple riveter)	0.12	0.16
	0.845	0.575

AT LEFT
FIG. 2—For press counter-sinking of the rivet holes, die angles have been selected so that as the skin is formed it is also tapered toward the hole, thereby preventing serious enlargement of the hole which would be conducive to cracks emanating from the edge.

• • •

AT RIGHT
FIG. 3—A spring-loaded stake, when used on an air-operated toggle squeezer, holds the sheets tightly together during press counter-sinking and riveting operations and prevents the rivet stock from flashing between sheets, besides assuring a tight set rivet.



the master die and subjected to a force of 10 to 12 tons in a hydraulic press. The outside diameter is then turned to size and the hole reamed, followed by heat treatment. Punches for countersinking are also cold pressed in a similar manner.

The operation sheet, Table II, shows how a considerable reduction in minimum time has been effected in flush riveting over the former brazier riveting operation. Operations *a*, *b* and *f* remain unchanged. Operation *c* was improved by substituting a device more readily assembled and disassembled than screws. It is not possible, however, to use the spring fasteners in all assemblies, and wedge and pin or screws are still used, particularly on certain portions of the fuselage. Operation *d* has been eliminated and the new operation *e* combines redrilling to size and machine countersinking by means of a special countersinking tool, Fig. 6. Operation *g* is automatically improved in that a brazier rivet requires that a cupped set accurately engage the head, necessitating greater care than with a flush rivet for which only a flat set need be used.

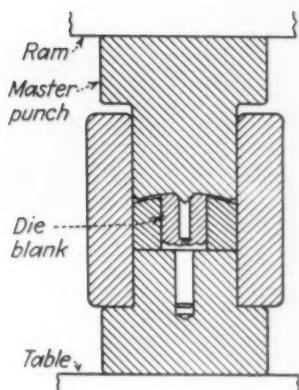


FIG. 5—Operation of cold pressing countersinking punches and dies used in flush riveting operations.

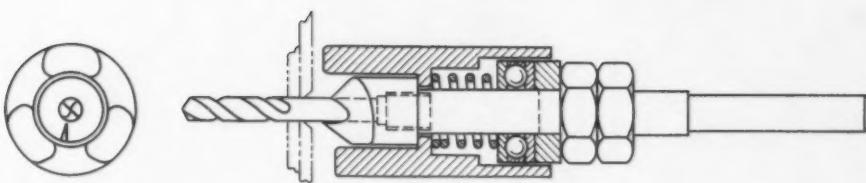


FIG. 6—Combination drill and countersinking tool used in preparing holes for flush riveting of airplane skin structure. The spring-loaded collar helps in holding the sheets together during this operation.

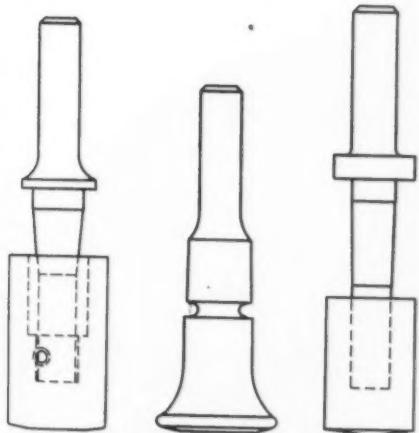


FIG. 7—Typical rivet driving tools used in pneumatic squeezers for setting flush head rivets.

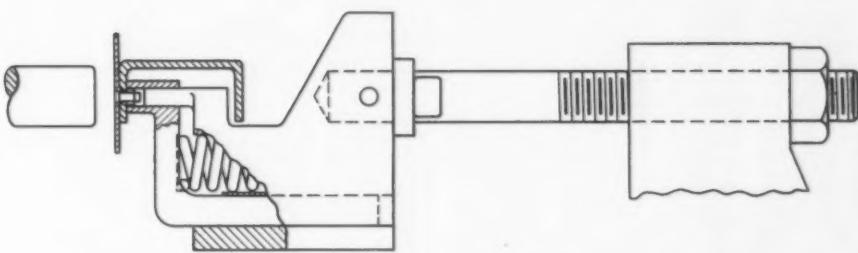


FIG. 8—A special feature of the rivet driving tools is that of holding the sheets tightly together by means of suitable spring loading during the operation.

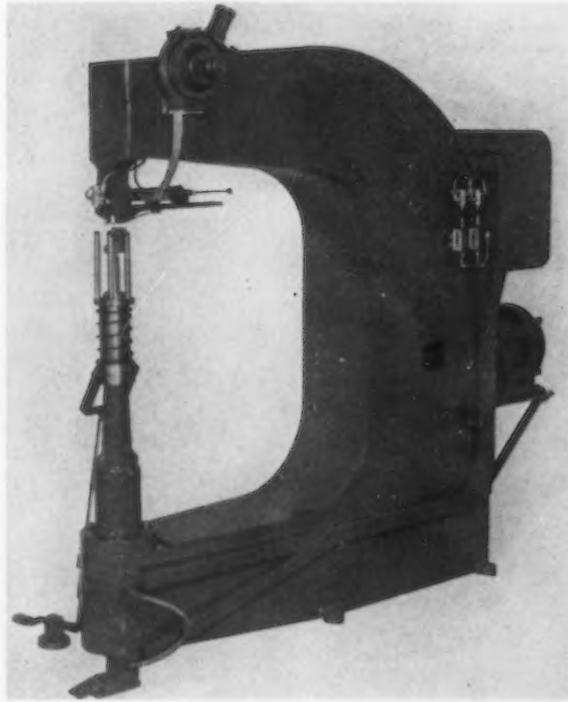


FIG. 9—One of the latest units for setting countersunk head rivets in aircraft fuselage, such as described by Mr. Berlin, is this Tomkins-Johnson hydraulic unit with automatic magazine feed. Up to 12,000 lb. pressure can be applied to a rivet.

Machine countersinking of the skin involves a problem of accurate depth control, using a tool and a non-rotating stop. As shown in Fig. 6 the stop is held in contact with the skin by a spring so as to prevent chips from getting under it and scratching the surface. Generally multiple flute countersinks are used, although a single flute countersink is shown, which is practically free from chattering.

There have also been other means employed for cost reduction. Gang or multiple riveters which drive eight to ten rivets simultaneously permit one operator to drive 6000 rivets in an 8-hr. day. With a helper to place rivets in the holes the output per day is doubled. Hopper feeds are also being developed for this purpose.

New types of fast operating, deep-throat squeezers for press countersinking and riveting have also ma-

terially aided in reducing cost, particularly through the use of special high speed hopper feed riveters.

Another important change has been in the rivet material itself. First, through the use of 17S rivet material in place of 17ST aluminum alloy, approximately 0.2 min. per rivet has been

saved due to the elimination of refrigerator service, handling, etc. Later the 17ST material was changed to A17ST to eliminate the cost of the critical handling that the former required and to avoid the removal of over-agehardened rivets that become defective upon driving.



Case

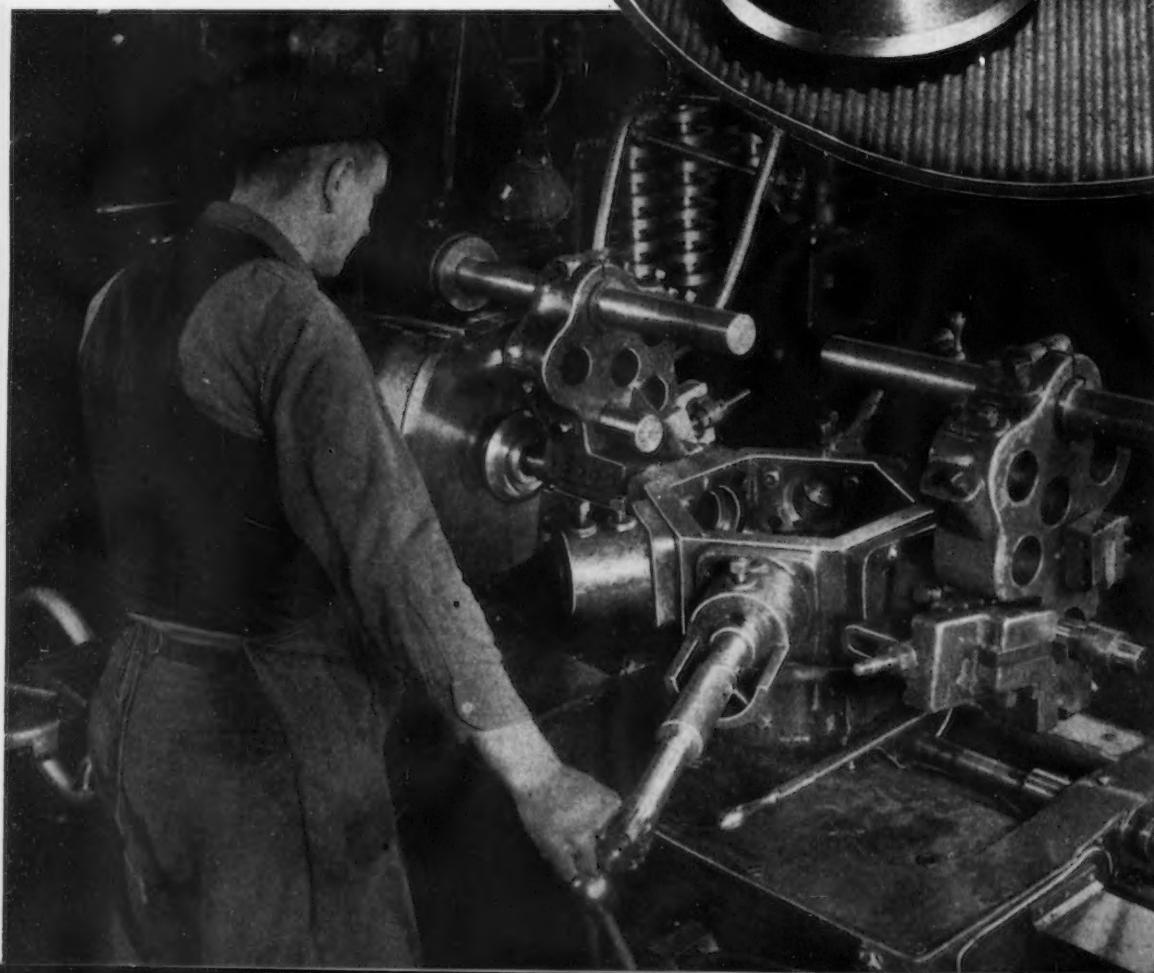
ON an older type of the same machine these bevel gears of Hy-Ten B-4 were machined in 48 min. each. More rigidity and flexibility of control in modern turret lathe reduced the time to 19 min.

○ ○ ○

ABOVE

PRODUCTION time for making 2400 of these valve bodies, lower plugs and upper plugs, was formerly 15,600 hr. on engine lathe. On cross feeding turret lathe with automatic brake the time has been cut to 5,400 hr.

○ ○ ○



MULTIPLE turning heads on the modern turret lathes provide a flexibility of operations impossible to obtain in the past, virtually converting a machine into a machine shop.

○ ○ ○

Studies in Cost Reduction

PRDUCTIVITY per man and machine hour is the one big "out" for the factory manager in approaching cost reduction nowadays. And modern machine tools do an amazing job in this respect. Here, for example, are some case studies based on the operation of the latest Gisholt turret lathes. This is first of a series covering a broad range of machines and products.

AT RIGHT

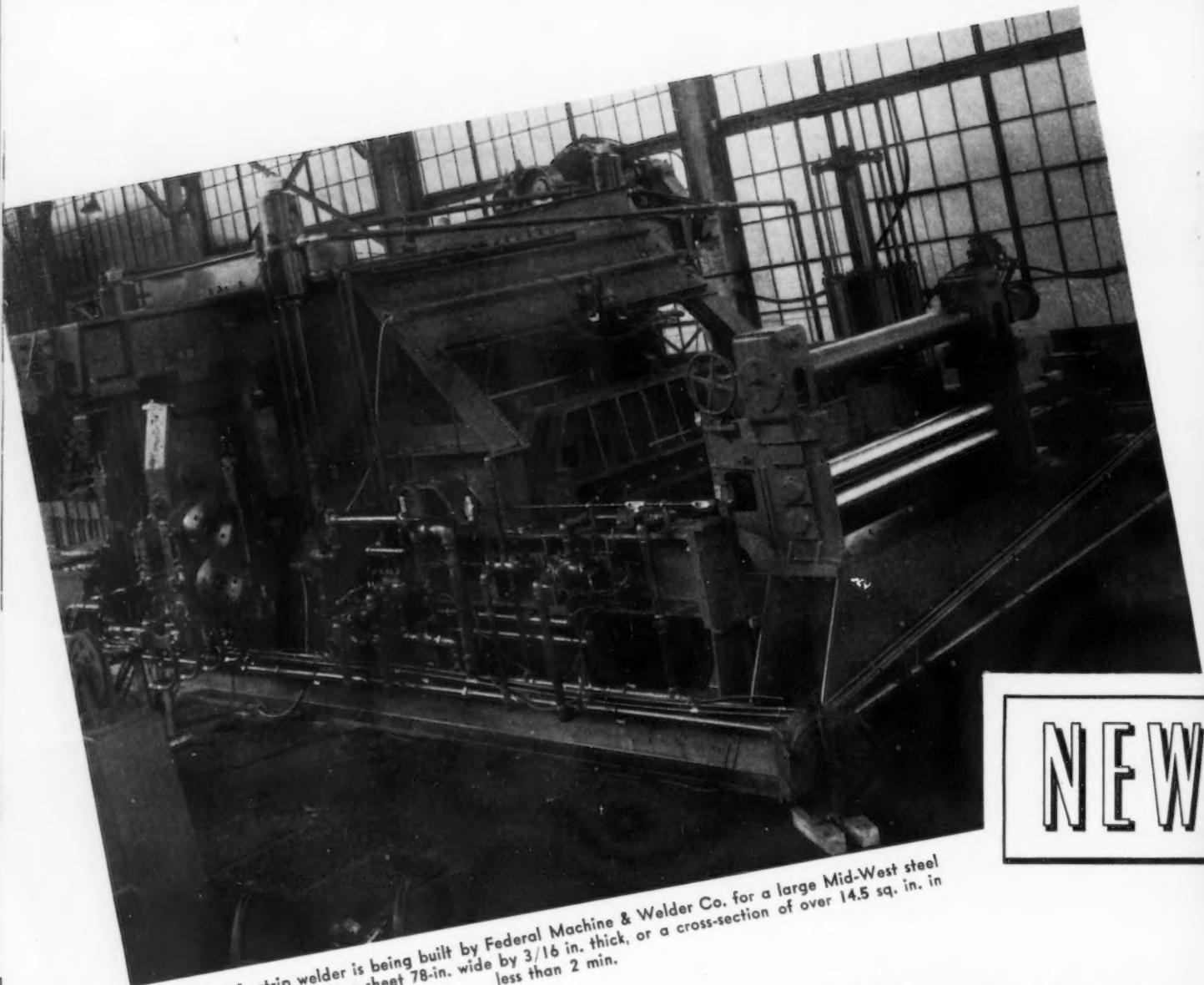
GISHOLT makes its own turret stop screws, and new machines have hastened their output by shaving 47 per cent from the previous machining time.

• • •

BELOW

TWO operations are used in making the stop screws, requiring two chucks and a number of speed changes from threading to drilling a number 0 hole. The time saving was largely due to automatic speed selection.





NEW

THIS wide strip welder is being built by Federal Machine & Welder Co. for a large Mid-West steel producer. It will join a sheet 78-in. wide by 3/16 in. thick, or a cross-section of over 14.5 sq. in. in less than 2 min.

By E. W. FORKNER
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ONE contribution toward greater efficiency in the handling and use of wide strip stock has been made through the development of a special combination machine for welding wide strip sections together, end to end, prior to the pickling operation. This has been common practice for some time on strip stock up to a reasonable width, but on very wide stock the time element in welding and stripping, distortion of the sheet, and inconsistent welds all have contributed to make the practice uncertain.

The speeding up of the continuous pickling process likewise has helped to make a welding machine more difficult to devise. In some cases the

speed may reach 100 to 125 ft. per min.

The sequence of operation in the Federal machine is as follows:

As the coiled stock comes from the hot mill it is deposited in a leveling processor, the end of the outmost convolution being entered between the rolls and proper pressure applied, depending on the gage of stock being handled.

In addition to leveling, the processor removes much of the scale, thus improving contact in the welding dies.

Immediately beyond the processor is a table, 12 to 14 ft. long, having an air actuated jack in the center, the purpose of this jack being to raise the sheet of stock to form a pronounced arc. This eliminates the necessity of concise alinement of the processor in relation to the welding machine when the centering mechanism of the welder performs its function, and also provides the stock necessary for closing the welder after

trimming just prior to welding. However, the jack is not engaged until an upcut shear (stationed between the table and the welder) has performed its function of cropping the fish tails from the end of the sheet and the sheet is fed into the welder to its proper location preparatory to welding.

Cropping of the sheet end is not to be considered final preparation for welding. Facilities for the final trim are contained in the welding machine proper. After cropping, the sheet enters the pinch rolls of the welder, which feed the sheet into the welder. This operation is controlled from the operator's station.

The operator then causes the sheet to progress until the leading end is approximately 1 in. to 2 in. beyond the weld line face of the upset platen die. At this time the air actuated centering mechanism performs the function of alining the sheet relative to the center line of the machine. This mechanism continues to exert pressure on the side edges of the sheet until pressure is relieved from the pinch

rolls. When the upper pinch roll retracts the sheet is free to adjust itself to the centering mechanism, prior to being clamped between the welding dies.

Much time and thought were given to providing an efficient clamping arrangement in order to overcome existing difficulties experienced in welding wide sheet stock. As a result, slide ways for bringing down the clamp arms were eliminated by having the arm fulcrum in position, thus reducing wear. Offsetting, or countering the deflection in the arm, under reactions of approximately 125,000 lb. at each end, was necessary. This was accomplished by supplying the arms with multiple sections, individually spring loaded. Not only does this type of arm insure positive clamping pressure the entire width of the

and also the driving screw, and the driving power unit. It is of sufficient length to permit enough over-travel of the arm on the front or back side of the welder to be in the clear when the machine is closed for welding.

The entire sequence of operations has, so far, been as follows: The leading end of the incoming sheet has advanced through the processor, across the table containing the air jack and through the upcut shear. It then enters the pinch rolls of the welding machine and passes through the centering mechanism. The sheet halts at a desired location relative to the weld line face of the upset platen die. While remaining in this position the air jack on the table is caused to function and the processing leveler is halted. Pressure of the welder pinch rolls is relieved and the sheet

stationary dies are raised to avoid drawing the sheet across the face of the lower dies. These rolls remain in up position until repeat of welding sequence is again reached. The name applied to the shear stripper, which is a Federal Machine & Welder patent, renders further explanation unnecessary, with the possible exception of mentioning shearing knives both above and below.

To make this type of stripping possible it was necessary to provide a clamp gripper with sufficient capacity to apply pressure for holding the sheet while pulling it through. This pressure is provided through a multiple of hydraulic cylinders. Also, the travel of this gripper, which is of sufficient range for absorbing the angle of the shear stripping knives, is hydraulically actuated.

MACHINE WELDS 78" *At a go*

sheet, but it also insures the electrical contact for the entire width.

The sheet is now clamped in position to undergo final trim just before welding. Likewise, the trailing end of the sheet, which has already been through the sequence set forth for the entering sheet, is trimmed at the same time, while clamped in the opposite die on the stationary side of the machine.

The trimming device is quite unique in that it is considered a part of a welding machine. Its function is of utmost importance in alining the two edges of stock with unerring accuracy. It is constructed in a manner that definitely controls its speed as it passes through the 24-in. opening between welder dies. Also the height of the rotary trimming discs (similar to those on a slitting machine) is in a fixed vertical position. The arm which contains the trimming disc assembly proper is of very rigid design and suspended from a horizontal member. This member is mounted rigidly on the very top of the machine. It contains the guide ways for the arm

is properly positioned in the centering mechanism, after which it is clamped between welding dies and the final trim made.

Immediately following this sequence, the movable platen of the machine advances to the position of being ready to weld. As previously explained this travel is by means of an hydraulically actuated rapid traverse drive. With precise timing the cam roll lever (also hydraulically actuated) is raised to a position of alignment between the upsetting cam and the upset platen. The upsetting cam drive is engaged at this instant and the weld is performed, thus bonding the leading end of the incoming sheet and the trailing end of the sheet preceding it. Without further hesitation the upper dies of the upset platen and the stationary side are raised in order to free the sheet for pulling through the snow plow shear stripping arrangement, which at this time is closed to sheet thickness.

Simultaneously with the raising of the dies a group of sheet lifting rolls which are immediately back of the

Upon completion of the gripper travel two hydraulically actuated side clipping dies are brought into action. Their function is to trim the sheet on each side edge directly in line of weld. This is quite important, as it removes that portion of surplus weld material that the plow shear stripper does not reach. The hazard of injuring the rolls of the mill following the pickling operation is eliminated.

The operator now engages the pinch rolls on the outgoing end of the machine and the stock is taken through with sufficient rapidity to deposit enough stock in a looping pit to supply the pickler while another weld is being made.

The magnitude of this machine may be visualized by its ability to weld a sheet 78 in. wide by 3/16 in. thick, or a cross section of over 14.5 sq. in., in a time often less than 2 min. The producer gains a continuous process in the mill and avoids loss of time. And a user of this wide material is enabled, likewise, to set up a continuous process through punching and forming machines.

Gating and Feeding

By A. M. CAMPBELL

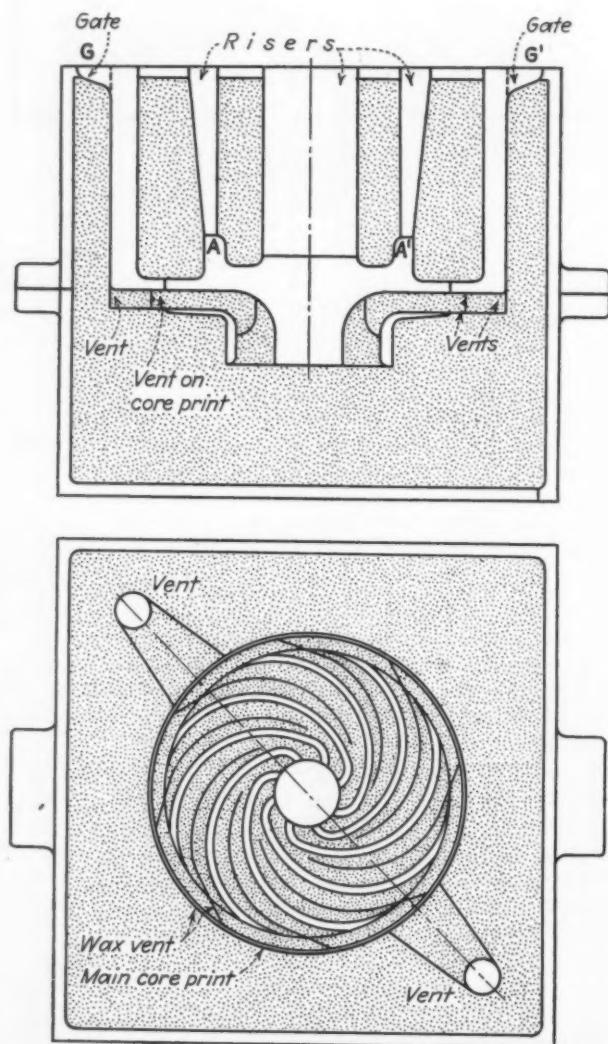
G. & J. Weir, Ltd., Glasgow, Scotland

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An example of another type of impeller to be cast in monel metal is shown in Fig. 8. In this case the center boss is about $4\frac{1}{2}$ in. diameter spreading out to a 6 in. diameter where it joins the shroud. There is a further thickness of metal attached to this shroud for the packing ring as shown at A and A' in the sectional view. The blades of his impeller are only $5/16$ in. thick, while the shroud

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order to overcome this method of molding was reversed so as to obtain risers over the center boss and from the packing ring, as shown. Further, to avoid cracking and to give a more even heat distribution, two side gates cut at the parting were used. This arrangement gives direct access to all the blades and has been found to be the most successful method of casting this type of impeller. Two hand ladles are required to cast these impellers at points G and G'. The sprays used are

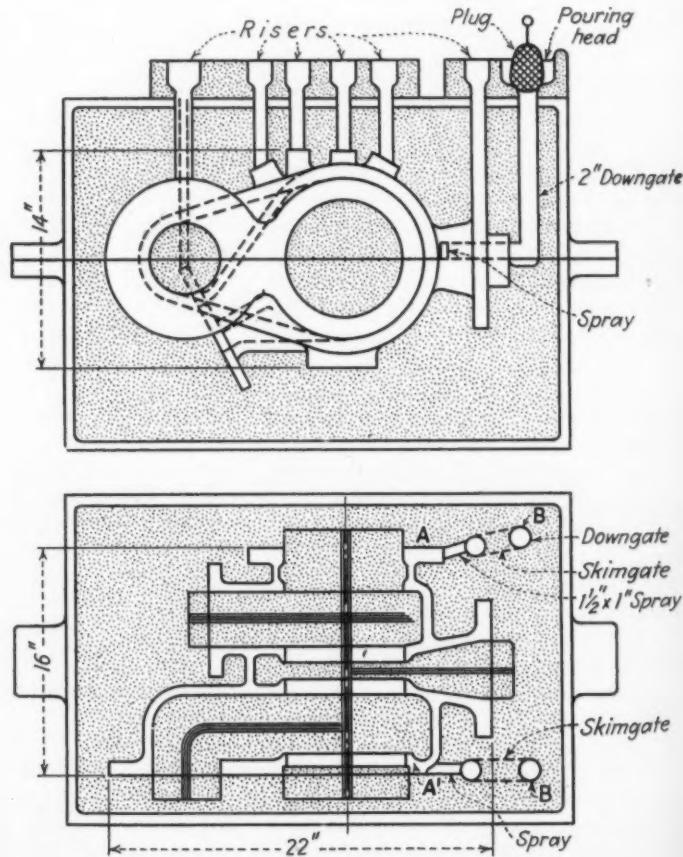


AT LEFT

FIG. 8—To avoid cracking and to provide a more even heat distribution in casting this monel metal feed pump impeller, two side gates, cut at the parting line, were used.

BELow

FIG. 9—Direct dirt trap gates were employed in casting this gun metal valve body. Average section thickness is $7/16$ in.



of rectangular section 2 in. x $\frac{3}{8}$ in., while the downgate is 2 in. in diameter.

The following examples were cast in Admiralty gun metal having an approximate analysis of 88 per cent Cu; 9.5 to 10 per cent Sn; 1.8 to 2 per cent Zn and 0.5 per cent max. Pd. In dealing with the gating and feeding of this alloy, the main points are:—(1) The sprays should be larger in area than generally required for cast iron; and (2) while risers are necessary to deal with liquid shrinkage in some cases, feeding is more or less regulated by the casting temperature.

There has been ample evidence of shrinkage cavities due to too low a casting temperature. There is a wide divergence of opinion as to the correct casting temperature, due possibly to the fact that various authors have in mind different kinds of castings and different foundry conditions. In the examples given above, the casting temperature range of the metal was 2156 to 2228 deg. F.

In this, the second and final chapter of Mr. Campbell's paper, the gating and feeding of monel metal, gun metal and high tensile bronze are discussed. In the first chapter, published in the issue of March 23, 1939, the fundamentals of gating and feeding and their application to cast iron were covered. The Iron Age is indebted to the Institute of British Foundrymen and G. & J. Weir, Ltd., for permission to publish this material.

the metal enters the mold through flanges A and A¹ by two in-gates, B and B¹, of the direct dirt-trap type, correctly proportioned. Risers taken from the casting at the points shown overcome liquid shrinkage, feeding being governed by correct casting temperature.

The plan and section of a mold for a large gunmetal de-aerator casting, weighing approximately two tons, and of $\frac{7}{16}$ in. average thickness, is shown in Fig. 10. On account of its size and section, the gating had to be considered very carefully, more particularly since internally the casting had a baffle box attached by ribs to the external contours of the casting. Arrangements had to be made to get the hot metal to this box as well as provisions for casting the outside contours. The following arrangement was found to give satisfaction by avoiding a mis-run. Provision was made for casting with two ladles, one on either end of the

Fig. 9 shows the section and plan of a valve body, fairly uniform in section. The manner in which this body is gated will serve to illustrate a clean and successful method and can, with modifications, be applied to numerous types of castings. As shown in Fig. 9,

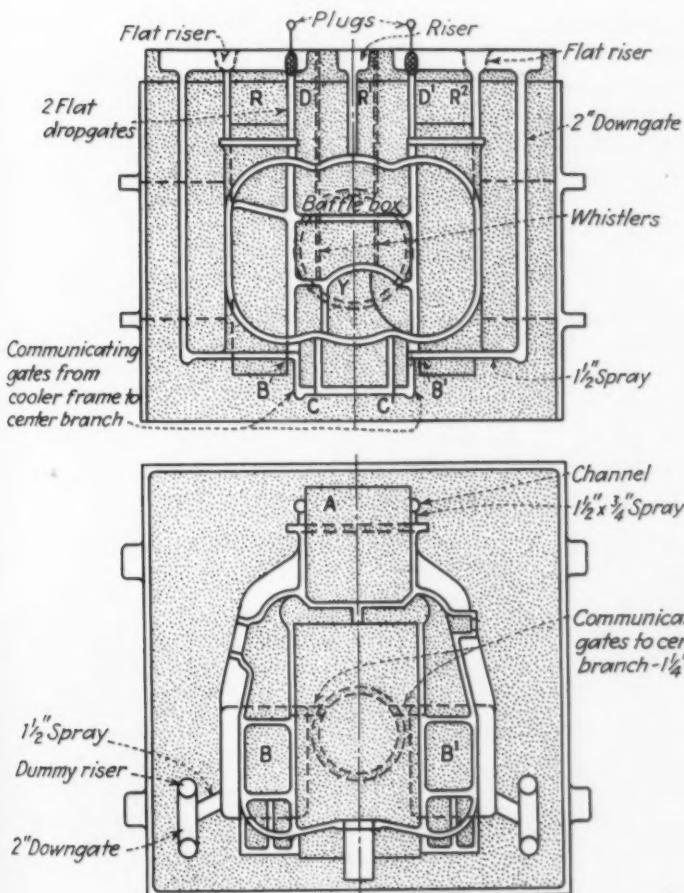


FIG. 10—Because of the size and section of this de-aerator casting, the gating and feeding methods used were particularly important in securing a sound casting.

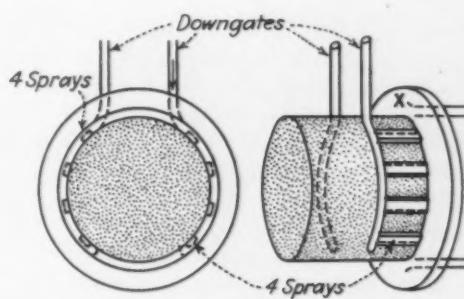


FIG. 11—This enlarged view shows the arrangement of sprays for the de-aerator casting illustrated in detail in Fig. 10.

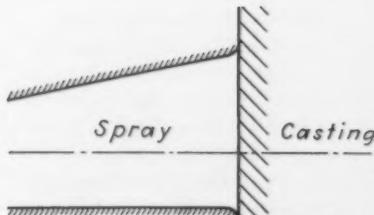


FIG. 12—Sprays for high tensile bronze should be flared at the joint to avoid creating a fountain effect in the metal entering the mold.

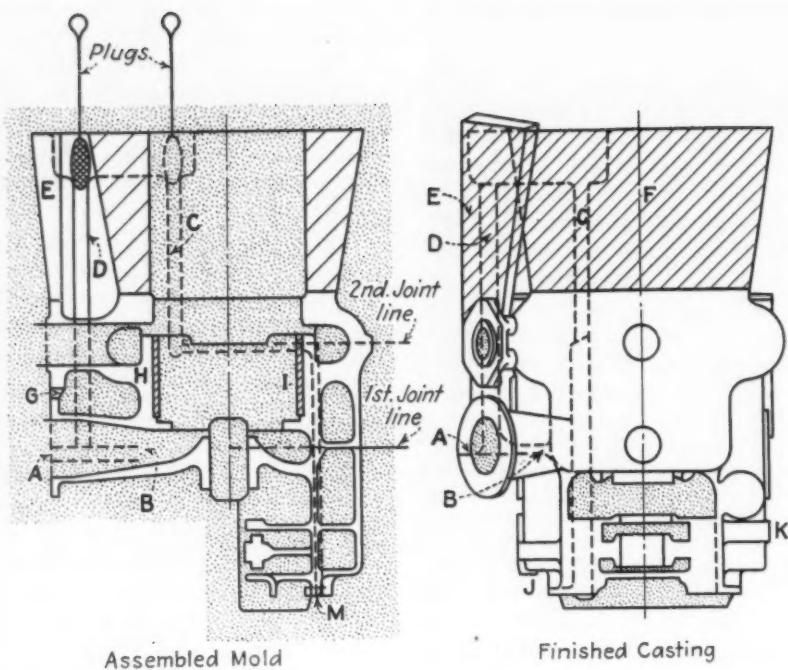


FIG. 13—The greater shrink rate of high tensile bronze imposed an added problem in selecting the proper method of gating and feeding this turbine pump casting.

mold. At A, Fig. 10, on the main core print, two channels were cut and each was fed by a main gate. Eight sprays were taken off these channels and entered the mold at flange X as illustrated in the diagram of the sprays, Fig. 11.

These main gates were $2\frac{1}{2}$ in. in diameter, while the sprays were $1\frac{1}{2}$ in. by $\frac{3}{4}$ in. At B and B^1 (Fig. 10), at the other end of the mold, and entering stools at the bottom of the mold, two additional main gates were placed, each having a spray which entered the stool at the flange. These gates were 2 in. diameter, while the sprays taken off were $1\frac{1}{2}$ in. sq. Note arrangement of by-passing the metal to a dummy riser in order to ensure cleanliness.

This arrangement did not succeed in getting the metal to the bottom of the mold, and it would have risen in the mold about 1 ft., and then tumbled back into the cooler branch, which is at the bottom of the mold, and might have caused a cold shut. To avoid this the stool flange nearest this branch was connected by two sprays, as shown at C and C^1 , Fig. 10. These sprays were $1\frac{1}{4}$ in. sq. By this arrangement, immediately the stool flange became full of metal, it was by-passed to the bottom of the mold. Finally, on top side of the mold four drop gates were used at D and D^1 , as shown in Fig. 10. These were so arranged to pass down the metal thickness of the top stools, which,

in turn; were connected by ribs to the baffle box internally.

On casting, these gates were plugged, and gates at A and B started first. When it was judged that the metal had risen in the interior of the mold to the bottom side of the baffle box, Y, these

plugs were removed and hot metal allowed to drop on to the rising metal. These gates were 2 in. by $\frac{1}{4}$ in. Risers were taken off as shown at R, R^1 and R^2 , and whistlers, as shown by arrows in Fig. 10, in the box core to assist in eliminating any chance of an air lock in that portion of the casting.

The alloys from which examples are given herewith are made up approximately as follow: Cu, 54 per cent; Zn, 40 per cent; Fe, 1.7 per cent; Al, 2 per cent; and Mn, 2.8 per cent. The tensile strengths in the as-cast condition are in the region of 76,000 to 84,000 lb. per sq. in., with an elongation of 20 to 28 per cent. This alloy has an extremely high liquid shrinkage, and on this account heavy risers or feeding heads are required. Gating has to be such that as little turbulence as possible occurs when casting. This turbulence causes the formation of zinc oxide which, like sand, is highly refractory, and forms an inclusion to the detriment of the casting. Sprays, therefore, must be situated at the lowest point of the casting and shaped as is shown in Fig. 12 to obviate "fountain" effect. Casting temperature is also important for the same reason as it is with gunmetal. The most satisfactory casting temperature range for this metal, in the author's experience, is 1814 to 1868 deg. F.

Fig. 13 shows a section through the assembled mold and cores of a turbine pump casting in high-tensile bronze.

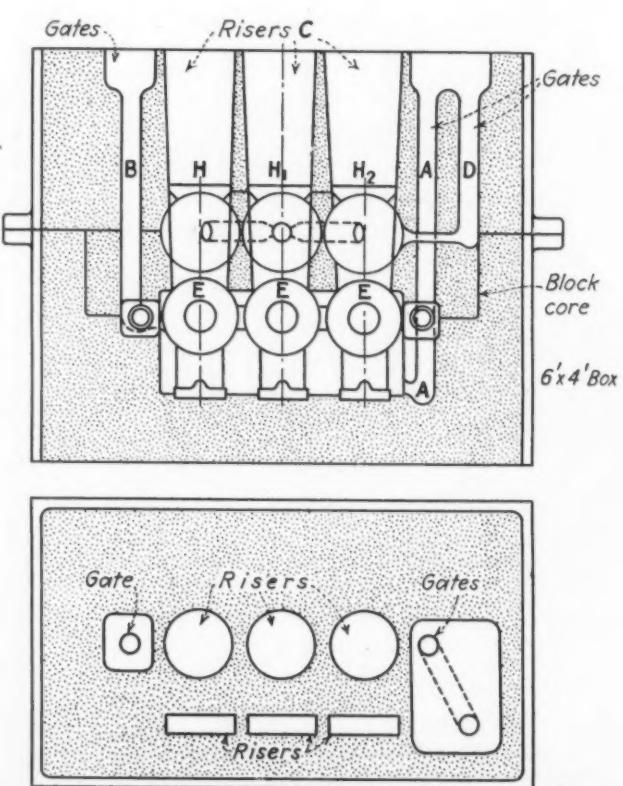


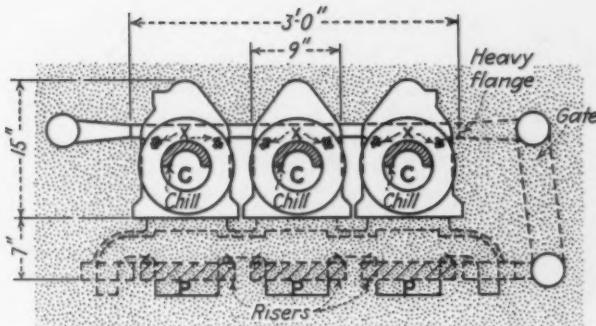
FIG. 14—This illustration shows the location of risers and gates in a three throw pump and valve box casting. Figures 15 and 16 illustrate the problems involved in producing this work in greater detail.

This pump has an oil box with bearing attached to the main pump body. The average section is about $\frac{1}{2}$ in., while the pump itself varies from 2-in. to $3\frac{1}{2}$ -in. section. On account of the high shrinkage of the metal the pattern was made so that the heavy pump sections were on the uppermost portion of the mold. The oil box was arranged at the bottom.

A gate was formed as shown at C, and stepped down gradually from the second to the first parting, finally to enter the mold by a spray at the flange in the bottom of the oil box at M. This gate was 2 in. in diameter. After stepping down the first parting it was reduced to $1\frac{1}{4}$ in. diameter, while the spray was 2 in. by 1 in., opening out to $2\frac{1}{4}$ in. by $1\frac{1}{4}$ in. A further gate D was stepped down through the second parting to the first and finally two sprays were taken at a tangent to the lower portion of the pump body, as shown at A and B. This gate was $2\frac{1}{2}$ in. diameter to second parting, then stepped down to $2\frac{1}{4}$ in. diameter, with two sprays 2 in. by 1 in., increasing to $2\frac{3}{4}$ in. by $1\frac{1}{4}$ in.

The total depth of casting was about 3 ft. 6 in., and a head of 2 ft. was found necessary, as shown at F. In addition, a riser was taken from the discharge branch as shown at E. This branch was, in turn, connected to the suction branch immediately below, indicated by G. This overcomes the high

FIG. 15—As originally cast with cores, shrinkage defects in the casting shown in full in Fig. 14 developed at the points marked X.



shrinkage which occurs after casting. When casting, both main gates were plugged until the runner head was filled. While still pouring, the plug on the downgate C was withdrawn and the metal allowed to rise in the mold to the first parting. When this was judged to be the position of the metal, the second plug for gate D was withdrawn and metal allowed to enter sprays A and B, and casting was continued until the head was filled. About $2\frac{1}{2}$ tons of metal was required to cast this pump—3500 lb. for the pump and 1500 lb. for head and risers. The gates were stepped as described in order to have as little turbulence as possible. In addition to the feeding heads described, densers (or chills) were necessary to overcome shrinkage at points H, I, J and K.

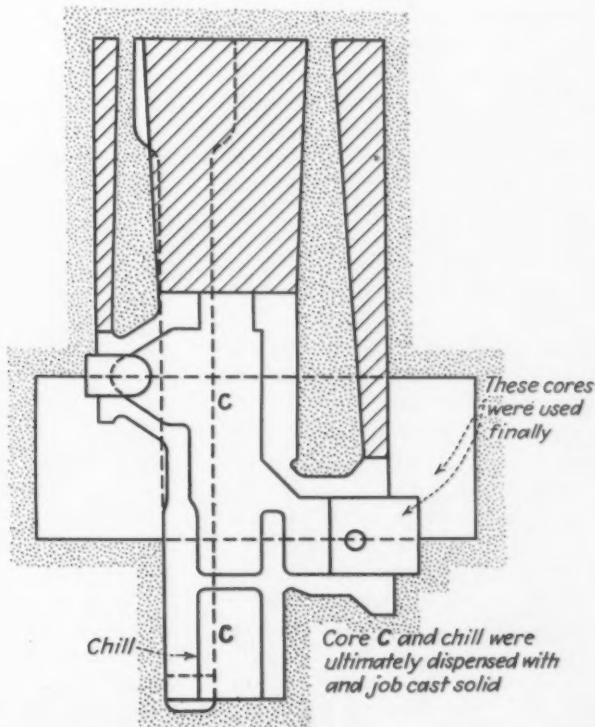
Figs. 14 to 16 show the top box plan,

mid-section, plan-section, and cross-section of a three-throw pump and valve box which was cast in high-tensile bronze. Originally, this casting was made with cores, as shown in Fig. 15, directly through the cylinder and valve with chills as marked at the heavy flange side of the cylinder, to overcome the shrinkage which occurred at the junction of the metal between this flange and the cylinders at the points indicated by X.

One gate was stepped down to the bottom of this heavy flange, as shown at A, Fig. 14. This gate was $2\frac{1}{2}$ in. in diameter, and stepped down at parting to a 2 in. diameter with a spray in flange 2 in. sq. opening to $2\frac{1}{4}$ in. sq. A second gate B was stepped down to the top end but at the opposite side of this heavy flange, and was also $2\frac{1}{2}$ in. in diameter with 2-in. sq. sprays opening to $2\frac{1}{4}$ in. A third gate D was taken to the parting, thence direct to the valve box flange. This was also $2\frac{1}{2}$ in. in diameter, with 2-in. sq. sprays opening to $2\frac{1}{4}$ in. sq. Risers were taken off flanges E, E, E, while the valve box and main heads were taken from top of cylinder, as shown at H, Fig. 14.

Originally the section varied from $\frac{1}{2}$ in. to $2\frac{3}{4}$ in. at the junction of the cylinders and the heavy flange at the bottom of casting. When the casting was made by means of center cores, Fig. 15, and chilled as previously described, trouble was experienced with shrinkage at the points marked X all down the junction of the cylinder and the heavy flange. To overcome this, these center cores were finally removed and the casting made solid, with the exception of the pipe connection core as shown marked P, Fig. 15. By doing this the shrinkage trouble was overcome and successful castings were obtained which withstood 2500 lb. per sq. in. water pressure. This casting required three tons of metal to cast, care being taken that the temperature was in the region of 1832 deg. F.

FIG. 16—By eliminating block cores and casting solid, as illustrated at right, the shrinkage holes shown in Fig. 15 were eliminated and a sound casting obtained.



Leveling Production Peaks

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By H. S. CARD
• • •

AND VALLEYS

SPOTTY demand is one of the tribulations of the power boiler industry that is not likely to be eradicated. If it were a seasonal demand, and if designs could be standardized as to dimension, some of the slack season time could be devoted advantageously to manufacturing for stock, in preparation to serve quick delivery orders when business picked up. But this can't be done with a custom built product. In some respects the trend toward higher steam pressures has not improved the situation, because the trend has involved a change in construction method from riveted to welded boiler drums, and the latter can be manufactured only by a tested and certified organization.

Enforcement of the regulations governing the construction of boilers starts right in the manufacturer's plant. The purchaser cannot be exposed to any risk of failure, because boilers simply are not shipped until they have been thoroughly checked for every possible defect in workmanship. The situation is further complicated because the inspection procedure gets under way in advance of all manufacturing operations, with a

check on the skill and proficiency of each welding operator.

Qualification Tests an Added Expense

Under such conditions, peaks and valleys in production can readily work greater hardship than in many other fields, because the laying off of qualified welders in slack periods means that new ones have to be found when business picks up. And this is not merely a matter of finding so many skilled men. There is the added expense of putting every new employee for that department through qualification tests for every one of the procedures which he will use; and it is common knowledge that qualifying expense normally amounts to several hundred dollars per man.

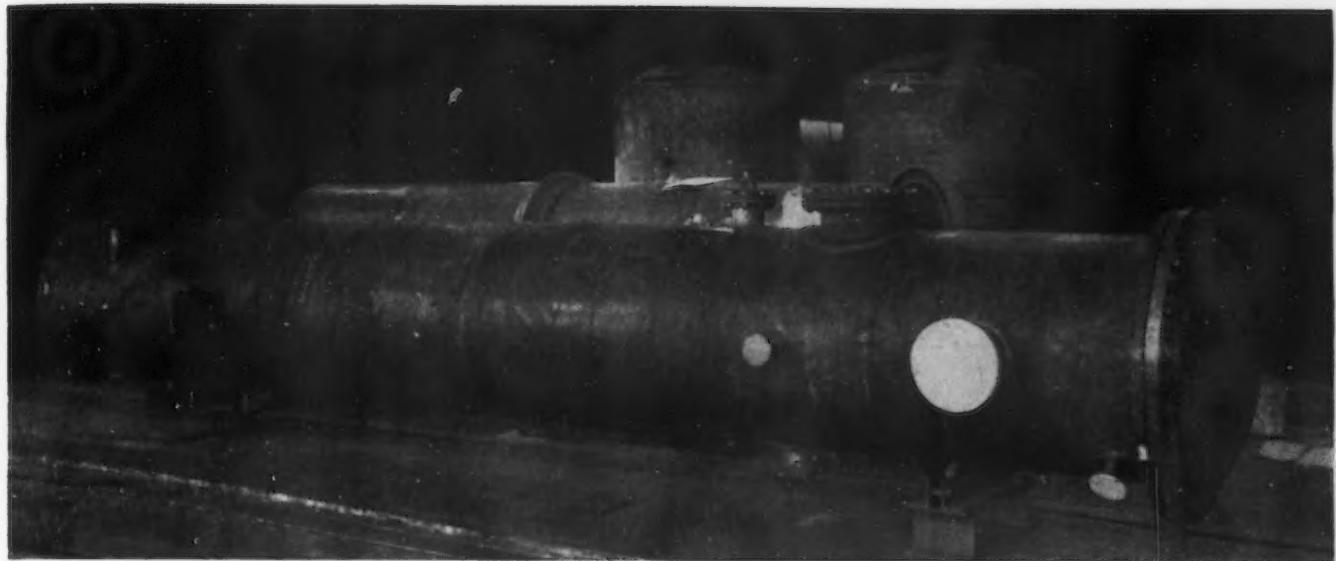
At present, a fabricator cannot meet an emergency by hiring welders who have qualified in other shops, because the testing program is mandatory without regard to experience or record of previous qualification. Therefore it is highly desirable to keep an organization intact. It is well worth noting further that employers of welders for this class of work are in general agreement that the only

satisfactory way to get good operators is to train them, bringing them up from one grade to another over a period of months.

A compensating factor has appeared

WELED construction has added to the desirability of leveling production peaks and valleys in the power boiler industry. Welded drums can be manufactured only by certified welders, the laying-off of whom means added expense in requalifying them or in qualifying new welders when a larger force is needed. Furthermore, the valleys may involve the loss of operators who have been progressively trained by the company for Class I work.

in the growing demand for unfired pressure vessels as well as a great variety of welded special equipment for the processing industries, articles which may or may not come under



IN A POWER BOILER PLANT PART I

the jurisdiction of any of the codes, and yet, by the nature of their service, can be satisfactorily produced only in plants which have the special facilities and the trained personnel

product of the same shop which fabricates a wide variety of pressure vessels and process industry equipment.

Incorporated in 1868 as the Edge Moor Iron Co., this concern for many years did a large business in the normal run of structural iron and steel work. About 1895 it began the manufacture of a line of box header boilers, and these in turn gained a reputation which justified the large investment in machinery improvements and in the organization of capable workers from the engineering staff on down through the shops. The box header boiler, however, lost its place in the market when the trend to higher steam pressures opened the way for the bent tube boiler. It was not only a new design that was in demand, but a new method of construction, because electric arc welding was supplanting the riveting operation for making boiler drums. Accordingly, the engineering staff designed a new line of bent tube boilers, and the shop staff installed welding machines, together with X-ray apparatus and stress relieving equipment which were necessary under the new regulations

governing boiler construction. A welding department was developed, qualified and put to work, and Edge Moor went to market with a modern boiler to meet the modern demand.

Company Reorganized

A brief word or two of history may be useful here in bringing the organization picture up to date. William F. Sellers, second president and principal owner of the original company, died in June of 1933. The trustees of the Sellers Estate desired to convert the property into something more suitable for a trust fund and soon arranged to do so. Edge Moor Iron Works, Inc., was organized in August, 1936, and purchased the complete business and plant of the old company. Thomas J. Dillon, president and principal owner of the new company, has shown his high esteem of former employees by retaining as many of them as possible (about 80 per cent) on the present payroll. For example, J. H. Shively, secretary and general manager, started with the company about 24 years ago, A. D. Flower, chief engineer of the boiler division, 21 years ago, and A. H.

At the Edge Moor Iron Works, peaks and valleys are smoothed out by the use of its boiler building facilities for a variety of other pressure vessel work requiring somewhat the same class of workmanship. Systematic scheduling of production to avoid congestion and delay in any one department and to assure maximum use of all fabricating equipment is also a feature. The second part of Mr. Card's article will appear in an early issue.

which it takes to do welded work that meets code requirements. This has been the experience of Edge Moor Iron Works, Edge Moor, Del., where water tube boilers are a standard

Hughes, shop superintendent, first went to work there in 1903.

During the days when riveted boilers were being made at Edge Moor the demand for other types of plate fabrication was growing, largely steel and chrome iron and steel tanks and pressure vessels. The range of this work has increased amazingly in 10 years under the influence of advanced designs in processing equipment and of the development of numerous special steels and non-ferrous alloys, now widely available in

customer specifications call for standards of process qualification, operator qualification, stress relieving, etc., that are almost identical with code requirements. In other words, the buyers have considered it necessary to write a specification which can only be met by a Class I welding organization.

Two active divisions occupying the same quarters and using the same production equipment might be expected to get in each other's way, particularly when the one makes a nearly

will be explained later, because it is preferable first to have a general idea of what goes on in this 24-acre plant.

Flow of Work Illustrated

Over a period of several years it has become evident that machines and tools that were installed primarily for boiler construction are great time savers as well on other varieties of work, so nearly everything gets used to some extent on the miscellany of special jobs. Therefore a survey of the flow of work incident to the con-

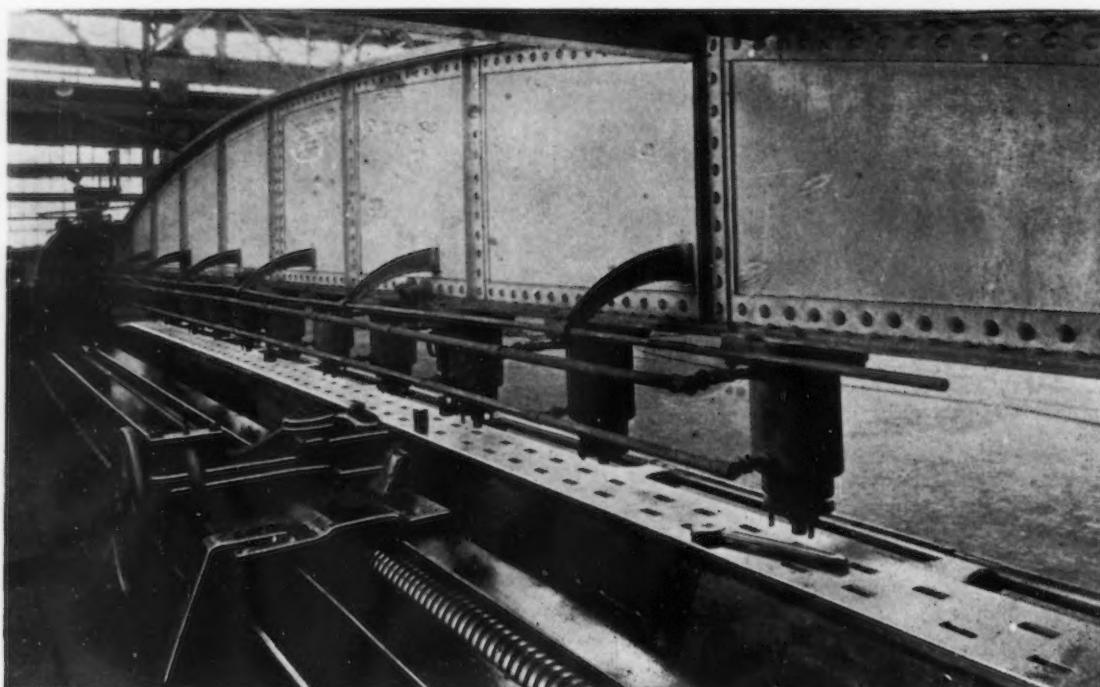


FIG. 1 — Plate planer used for final preparation of the welding edges. Precision in this operation is the key to perfect fit-up.

plate and other commercial shapes, each with its own range of corrosion resistant properties. The fabricating division of this plant has enjoyed a corresponding increase in scope, and derives business from numerous industries—petroleum, pulp and paper mills, chemical plants, food plants, dye works. Sizes will vary from a bubble tower that requires two cars for its loading, down to a jacketed vessel so small that in this huge plant it looks like a toy tea kettle.

Class I Welding Required for Most Work

Although 95 per cent of the welded work done in the plant is executed in accordance with code requirements for Class I or Class II pressure vessels, a generous portion of the fabricating division's business is in the form of articles which are not governed by codes. Instead, the cus-

standard product in a routine manner and the other produces a never ending variety of sizes and shapes; but there is not the slightest evidence of conflict here. One good reason is that although the boiler division and the fabricating division are separate and specialized in the sales and engineering departments, when they reach the shop they merge. Since the shop organization is not definitely split into two parts, it works as a unit on every job that comes in. Standard jobs and specials, large jobs and small, long jobs and short ones, flow smoothly through from order to shipping date. There is good common sense in all this, for heavy materials must be handled with greater deliberation, and without the hustle and bustle that is found in some production programs. Another good reason for the orderliness which prevails is the system of scheduling operations. This

construction of a boiler drum will give a good picture of what constitutes standard practice.

Approximate dimensions of a drum for one of the current types of Edge Moor boilers are: Length, 30 ft.; diameter, 8 ft.; and wall thickness, 1½ in.

This will be built up of two cylindrical shells and two dished and flanged heads, welded together. Each part of the shell will be rolled to form from a single plate. The assembly will thus require two longitudinal welds totaling the length of the shell, and three circumferential welds.

The first treatment to which the plate is subjected is a thorough inspection on both sides for surface quality, inspection for correct thickness and an etch test on the edge for sulphur segregations, laminations and inclusions. When approved, it is

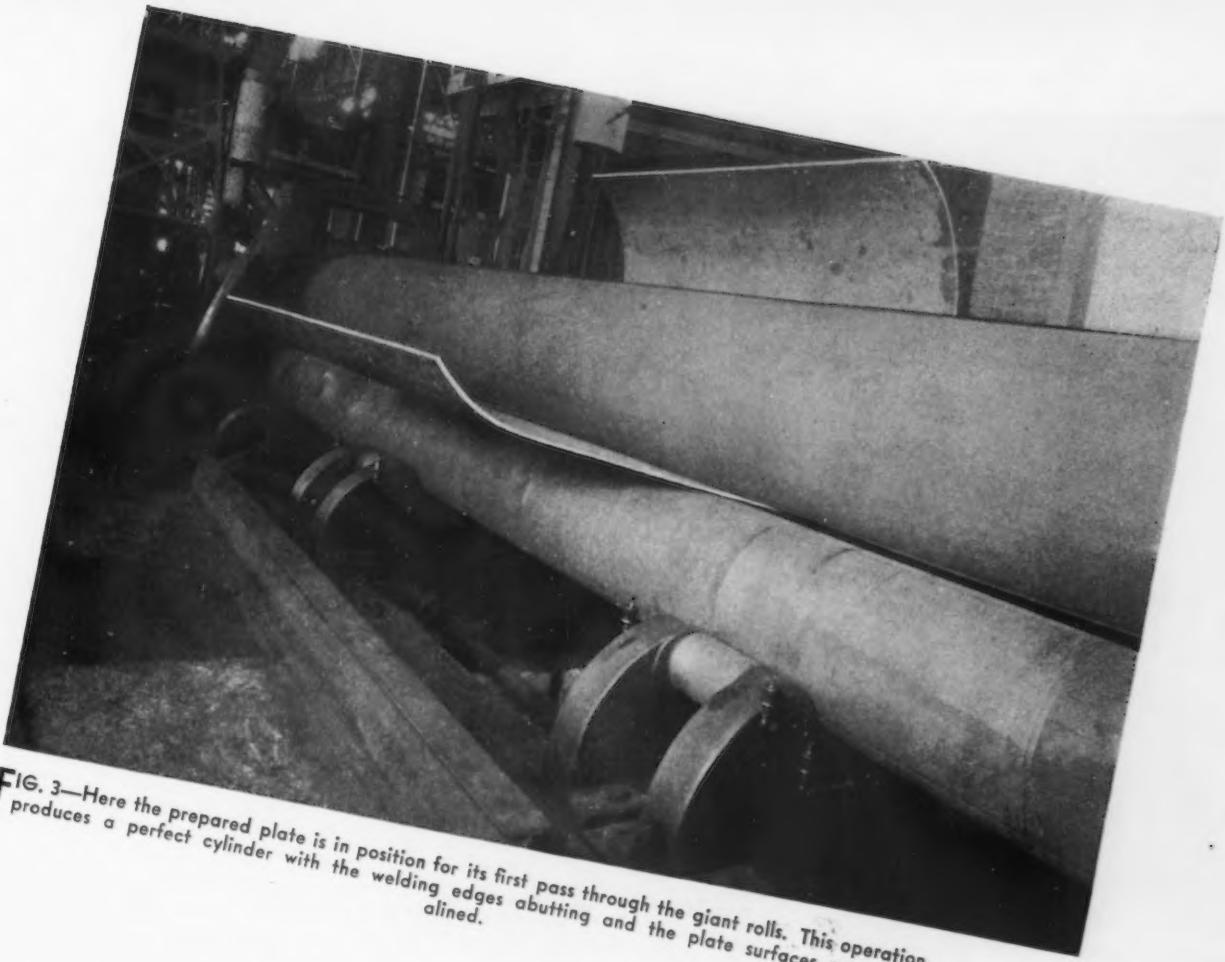


FIG. 3—Here the prepared plate is in position for its first pass through the giant rolls. This operation produces a perfect cylinder with the welding edges abutting and the plate surfaces accurately aligned.

brought in to the layout floor where the lines for cutting are marked on it. The layout work is checked for dimensions, and the necessary cutting is done with oxyacetylene cutting machines. Cut edges are cleaned of scale and inspected, then the plate goes to a 30-ft. plate planer (Fig. 1) for final preparation of the welding edges. Meanwhile the head is being machined on a boring mill.

Butt Welds Used Throughout

Butt welds are used throughout on the drum assembly. For a seam that is to be welded with two passes on the automatic welder, only a small V-groove is left on each side of the seam, and the flat contact surfaces of the edges are machined so accurately that they finally come together in what is practically a watertight fit. The same accuracy is required on the last head seam, although the design of the joint is somewhat different, consisting of a shallow V-groove for the manually-welded inside weld, and a deeper, narrow V for the outside weld on the automatic. Shop inspection of the machined edges is very necessary because of the precision wanted in the final fit-up.

Both of the edges which form the longitudinal seam are given a preliminary curvature in the crimping press, the dies of which are pictured

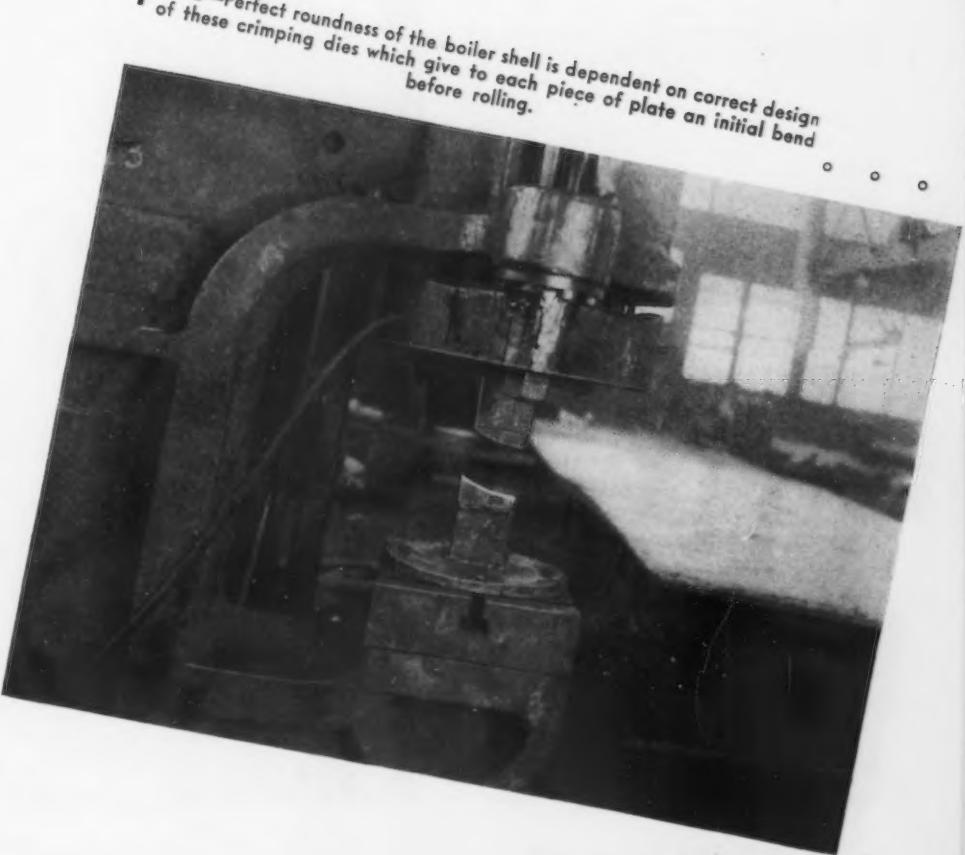
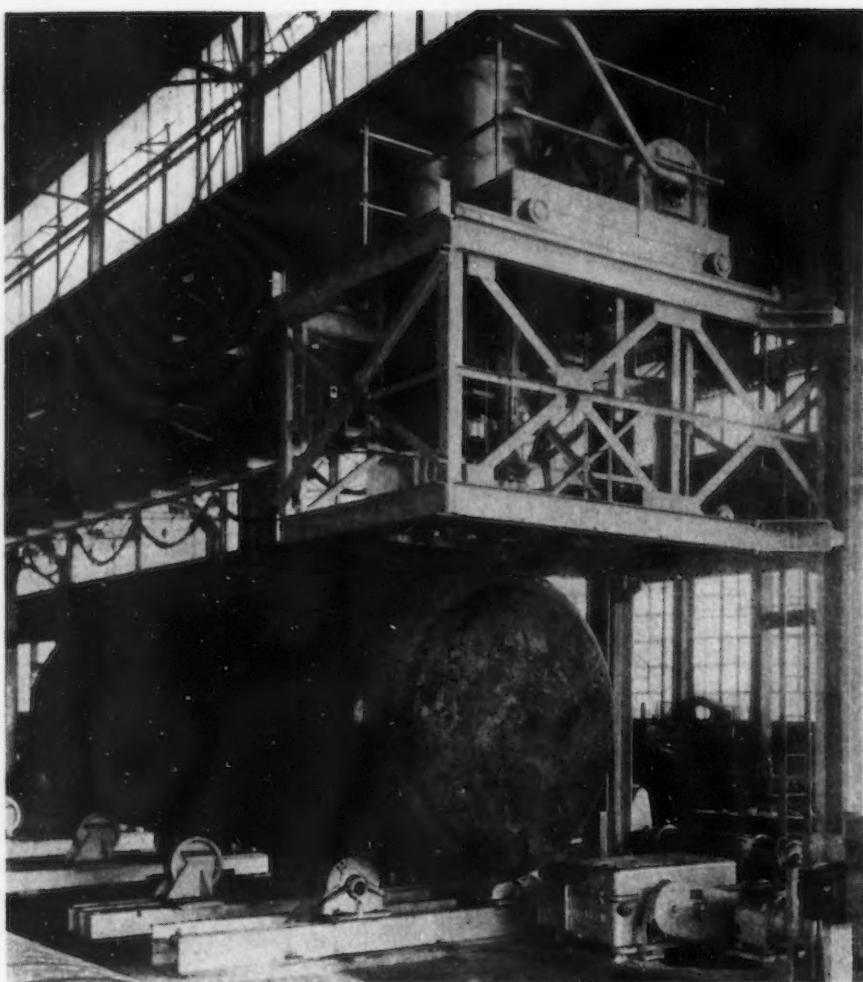


FIG. 2—Perfect roundness of the boiler shell is dependent on correct design of these crimping dies which give to each piece of plate an initial bend before rolling.



ABOVE

FIG. 4—Automatic welder, using Unionmelt process, with assembled shell in position for making outside pass on longitudinal seam.

• • •

in Fig. 2. Plate up to $1\frac{1}{2}$ -in. thick is crimped and rolled cold. Heavier sizes are heated in a plate-heating furnace before forming. In both cases the crimp is checked for correctness and uniformity of curvature before going to the rolls.

In the next operation the giant rolls pictured in part in Fig. 3 are employed. These are 29 ft. long, the top roll being 33 in. in diameter. The end housing swings down for removal of the cylinder after it has been inspected for roundness.

Automatic Welding by Unionmelt Process

As indicated above, the welding of all but one of the drum seams is by the automatic welder, using the Unionmelt

process (Figs. 4, 5 and 6). With this process a bare wire is used, and fed from a coil through a nozzle to the weld. Near the point of fusion the entire seam is covered with a heaped-up pile of a granulated material which completely covers the end of the welding wire. As the welding head travels along the seam the granulated material is automatically deposited in advance of the welding rod, filling the groove and forming a deep layer above the surface of the plate. Some of the granulated material melts in the welding heat, blankets the pool of fused metal, and effectively protects it from atmospheric contamination. A suction device follows the welding head, recovers unmelted material and returns it to the feeding receptacle above. The process permits the use of high current densities with correspondingly high speeds,

• • •

BELOW

FIG. 5—Close-up of automatic welding head in operation on inside pass of longitudinal seam. The flat plate at the end of the cylinder is standard test plate from which specimens will be cut for physical tests.

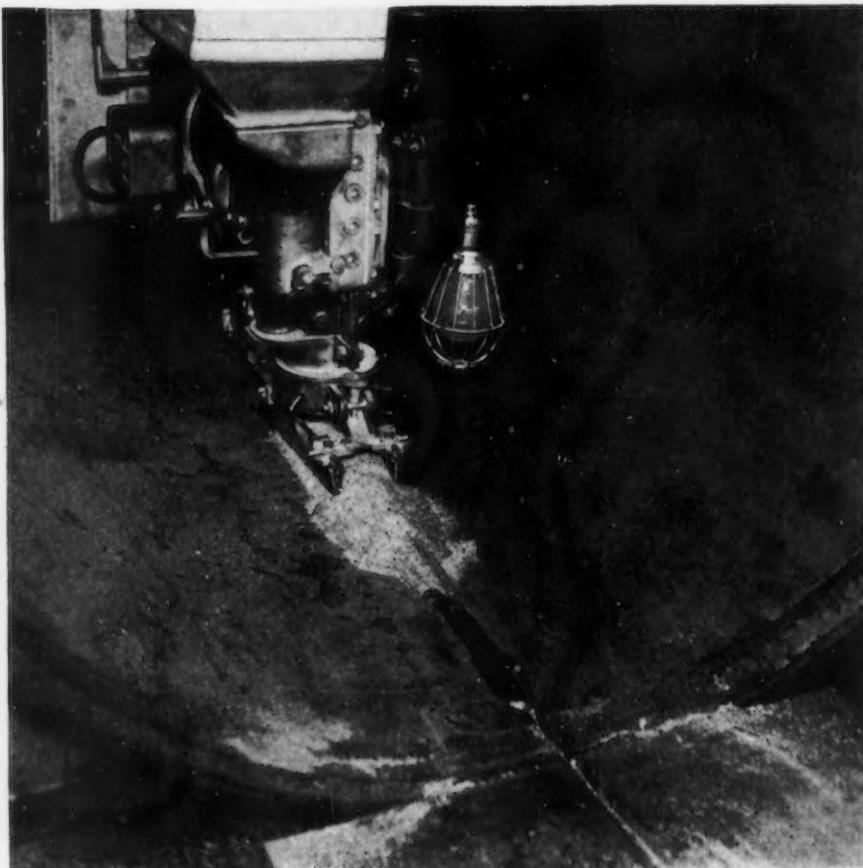


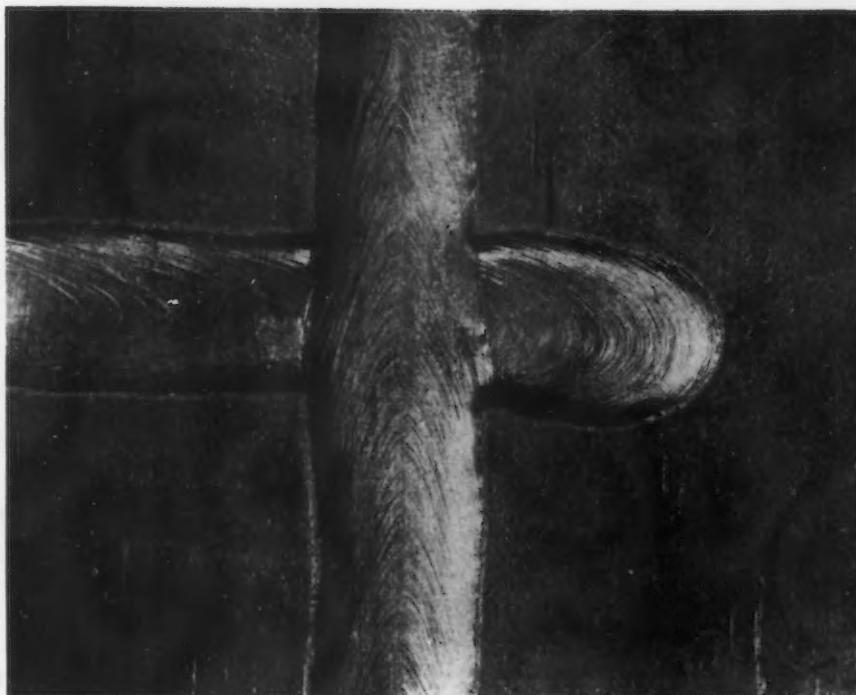
FIG. 6—Close-up of a completed automatic weld. This is the intersection of longitudinal and girth welds.

• • •

and the deposited metal meets all code requirements.

The shell is mounted on variable-speed rollers, automatically controlled, directly below the platform which carries the operator, the control mechanisms and the feeding apparatus. The platform can be raised, lowered or moved transversely. For welding inside seams the head is mounted on an arm. The apparatus will accommodate drums up to 15 ft. in diameter, and of any desired length.

The usual sequence with the automatic, which was installed slightly less than a year ago, is to weld longitudinal seams, then assemble one shell and head, then join the two shells, and finish with the girth seam. This last is welded inside by hand and then outside with the automatic. Total welding time for a drum of the size we are considering here is about 10 hr.



Previous to this installation all welding was done by hand. The automatic is used now for the welding of drums made of firebox steel in thicknesses of $\frac{1}{2}$ -in. or greater and for

girth seams on shells of 30-in. diameter and up. The two-pass technique is used almost exclusively at the present time.

(To Be Concluded)

Needle Valves Sprayed With Zinc

• • •

FOR years zinc has been a principal metal used for the general rustproofing of a large variety of iron and steel articles. There are several methods of applying the zinc, all well known, as for instance hot-dip galvanizing, sheradizing, electroplating, and, more recently, the metal spray process.

According to J. S. Martin of Metal-spray Co., Inc., Los Angeles, Cal., zinc coatings of virtually any thickness can be built up by metal spraying, and an outstanding advantage of the process lies in the portability of the

spray gun unit, which makes possible the galvanizing of exceptionally large and heavy articles either at the time of manufacture or after installation in their final location.

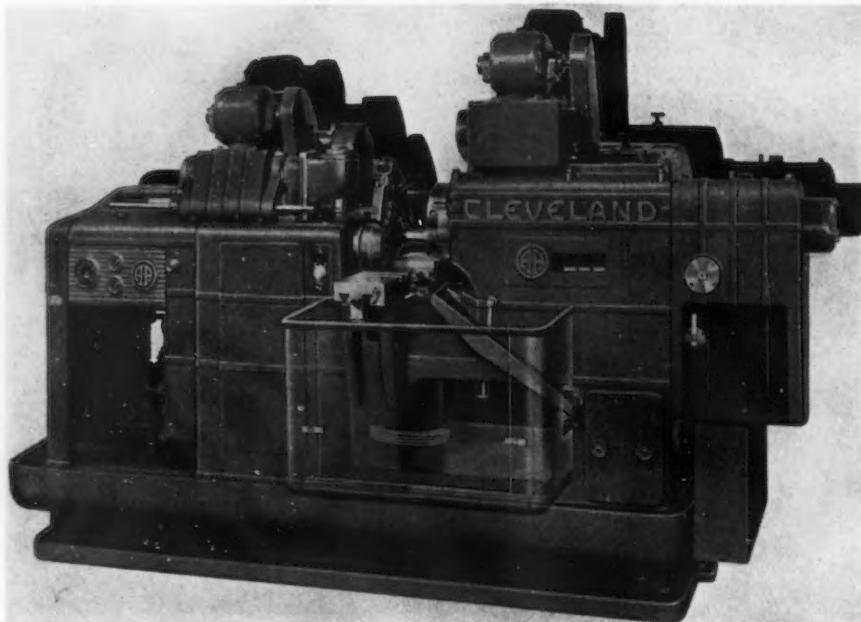
Typical of this particular utility of the metal spray method was the galvanizing of several large castings and parts making up four interior-differential type needle-valves. The complete job including the zinc spraying was done in the foundry and shops of the Joshua Hendy Iron Works, of San Francisco, for the Bureau of Reclamation, United States Department of

the Interior. The order was for two 54-in. diameter and two 66-in. diameter valves which were later to be installed at the Bartlett Dam in Arizona, and at the Almogordo project in the State of New Mexico. The Bureau's specifications called for metal spraying with a minimum of 2 oz. per sq. ft. of zinc on certain surfaces of the valve castings which were to be either directly in contact with the water or subject to its corrosive influence.

The various parts of the valves
(CONCLUDED ON PAGE 80)



New Single-Spindle Automatic Features



FRONT view of the new model 2-AA Cleveland single-spindle automatic, showing independent slotting and cutting off attachments located on a pad on the spindle head and a high speed drilling unit drive mounted on the turret head for second-operation drilling through one of the turret stations.

By FRANK J. OLIVER

Associate Editor, *The Iron Age*

CLEAR separation of the second-operation attachments from the machine proper, a new type spindle mounting and stock feed pusher are among the features of the model 2-AA completely redesigned single-spindle automatic screw machine just brought out by the *Cleveland Automatic Machine Co.*, Cleveland. Thoroughly modern in appearance, this machine of 1 1/16 in. bar capacity has a maximum spindle speed of 3275 r.p.m., more than double that of previous 1 1/16 in. models, and approximately four times the power to drive the spindle and feed train from a single 7 1/2-hp. motor. The

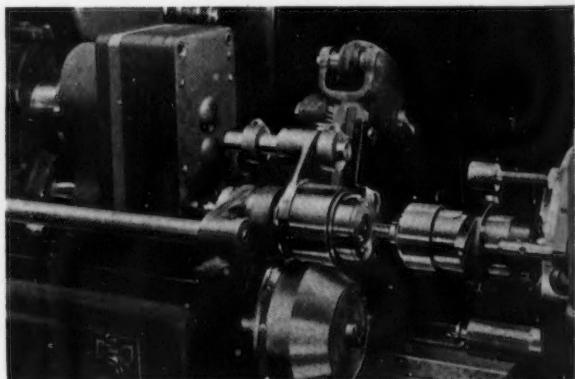
round turret, rotating in a plane perpendicular to the spindle axis, is retained, but has six holes in place of five and has been enlarged for increased clearance for end working tools.

In order to provide for clearest separation of attachments, all parts of the spindle head mechanism have been placed below the spindle, and a large flat surface is provided on top (as may be seen in Fig. 2, illustrating the stripped machine) for the mounting of attachments. These attachments may include: a magazine stock feed; a group of attachments that perform second operations on the work after it is cut off, such as slotting, drilling and threading; a cross slide turning attachment, and an independent cut-off attachment. A high speed drilling attachment may also be mounted over the turret tool housing for drilling before the piece is cut off the bar. In the example of second-operation work, a standard motorized



STRIPPED view of the new Cleveland single-spindle automatic, illustrating how the machine proper is free of attachment drives. Oil pressure gages are mounted on the instrument panel.

CLOSE-UP view of threading attachment fastened to the flanged face of a standard motorized unit for second-operation work on the Cleveland model 2-AA automatic.



Recent Machine Tool Developments . . .

unit with flanged face is supplied to receive and drive any of the whole group of attachments.

High speed drill spindles may be located in any hole of the tool turret and in adjacent holes. Drill spindle drive is effected by a gear mounted on the axis of the central turret shaft and attached to a sprocket gear driven in turn by chain from the attachment power unit on top. Variations in the drilling speeds are obtained by pick-off gears in the attachment drive.

The spindle head is a fully enclosed, all geared unit, with anti-friction bearings throughout. Spindle bearings are preloaded through a new principle said to produce greater rigidity than previously obtained on any Cleveland automatic. Spindle head gears are shaved for accuracy. Metallic friction clutches are used for speed changes and reversals, controlled by quick acting "load-and-fire" clutch shifters. Two forward spindle speeds and one reverse speed are available for each set of change gears.

The stock feed and chucking mech-

CLEVELAND Automatic has come out with a single-spindle machine, which while retaining the basic relationships between the spindle and tool turret rotation, incorporates a number of unconventional features. Chief of these are the independently driven attachments which are readily interchangeable without disturbing the fundamental machine set-up. National Acme has also introduced

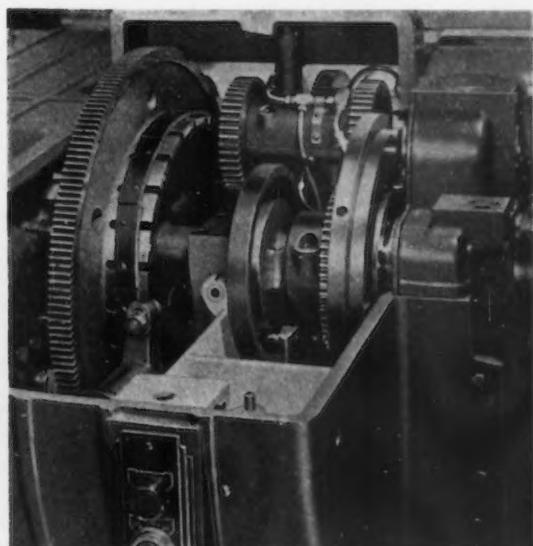
a small single-spindle automatic for handling a limited number of simple operations on hollow parts produced from bar stock. Other machine tools described in this review include a new line of broaching machines, the largest hone ever built, an abrasive cut-off machine of unconventional design, a tool grinding and lapping machine of universal type and a number of attachments.

anisms are located immediately back of the spindle head and are supported by a column at the end of the machine. A rigid anti-friction mounting is incorporated in the feed tube support. Maximum length of feed is 6½ in. The chucking mechanism has also been redesigned for operation at high speed. Both chucking and feeding devices are operated by drum cams instead of segments as in former models, so that double camming can be used for the

production of two pieces per cycle under certain conditions.

Single-Spindle Nut Machine

AMUCH more limited purpose single-spindle automatic for bar stock is the new 1½-in. single-spindle nut machine announced by the National Acme Co., Cleveland. Combining high production with a minimum of machinery investment, this unit is



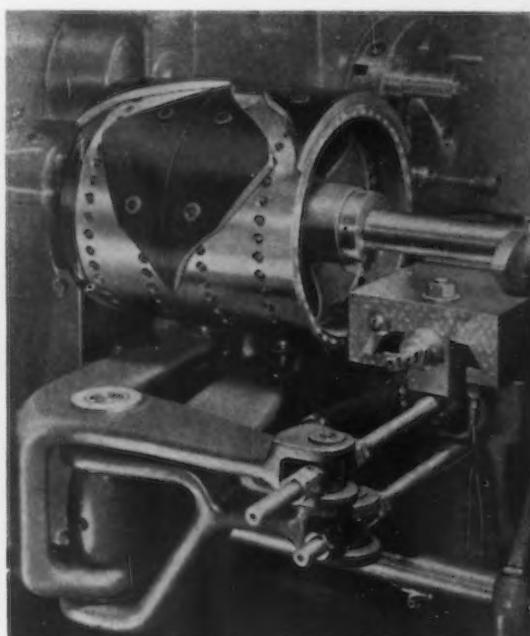
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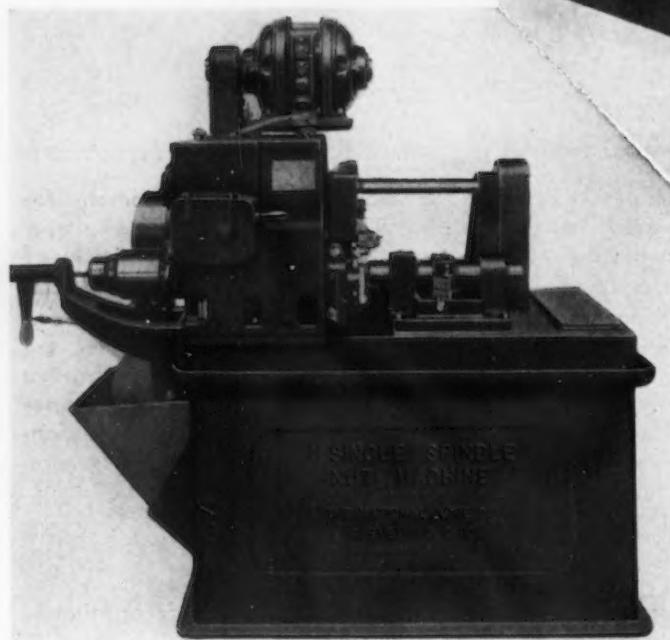
FEED of the turret head is obtained by a new infinitely variable mechanical transmission unit. Indexing the tool turret on the model 2-AA has been carefully worked out, using a three-roll indexing head and specially shaped accelerating and retarding cams. Timing of all operations is accomplished by the single heavy camshaft shown.

• • •

AT RIGHT

FRONT and rear cross slides are independently operated from this drum cam. Improvements in cross slide construction include inverted dovetail design of the rear slide, micrometer dial settings for securing quick adjustment to tolerance on formed work and neoprene wipers.

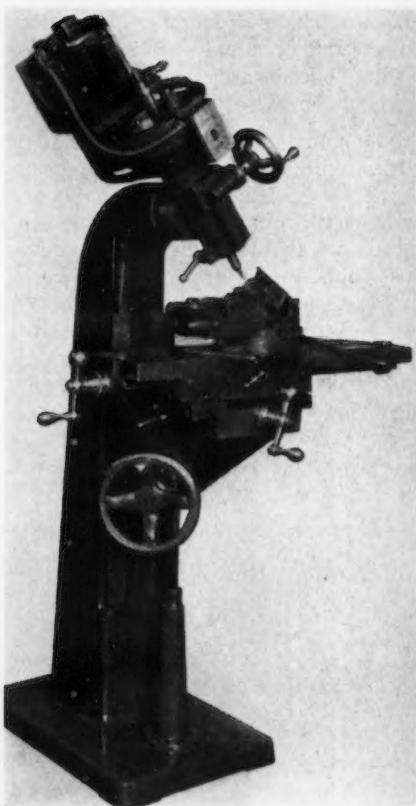




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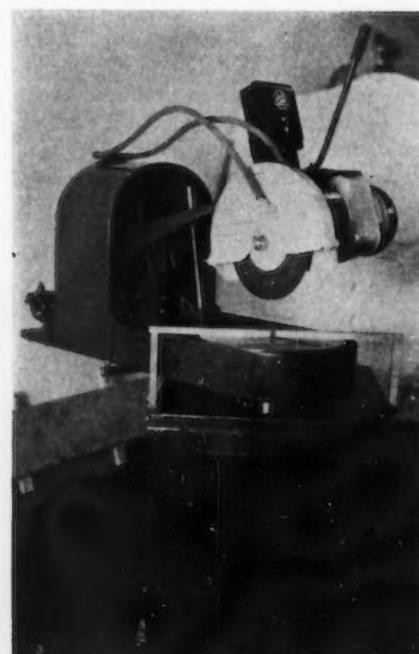
NATIONAL Acme's new 1½-in. single-spindle nut machine is a limited purpose unit for the manufacture of nut blanks, bearing parts, pin studs, rollers, inner races, washers and similar plain work requiring simple operations like forming, drilling and cutting-off.

ABOVE
CENTRALIZED and simplified control is featured in the improved line of type XL Oilgear horizontal, hydraulic broaching machines.



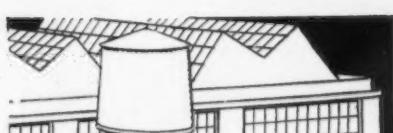
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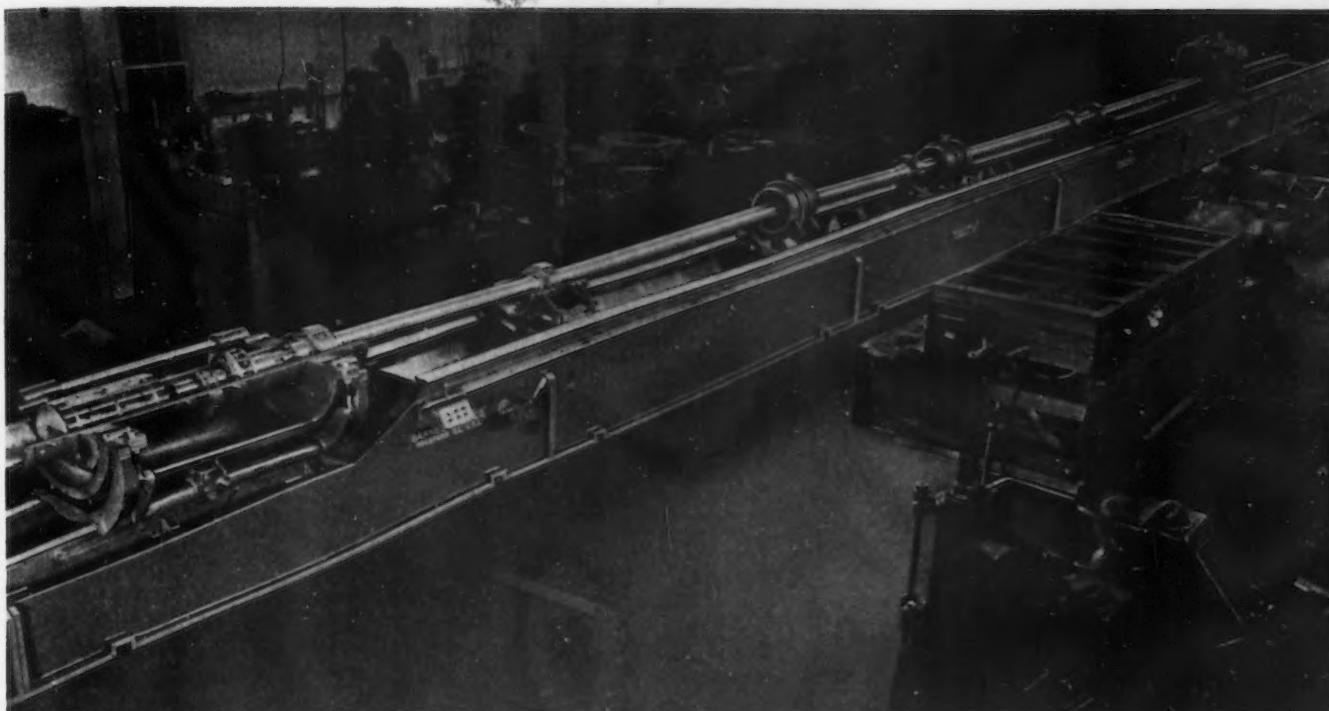
NO. 39 INDEX HIGH SPEED VERTICAL MILL, made by Blank & Buxton Machinery Co., Jackson, Mich., is designed for tool, die and experimental work. It will handle end mills up to $\frac{1}{2}$ in. and will mill a die 8×16 in. at one setting. The head swivels for milling and drilling at angles. Quill, which has $3\frac{1}{4}$ in. of travel, is controlled through a nut and screw movement.



ABOVE

MOTOR arm and base swings 45 deg. to either side of center in the Portman universal abrasive cut-off machine, made in 2 and 5-hp. sizes.





ONE of world's largest honing machines, shown being erected in the shops of the Barnes Drill Co., Rockford, Ill. The operating portion of the machine shown is 92 ft. long, but when assembled with work support bed, the machine has a total overall length of 184 ft. 2 in. and weight of 91,130 lb. Working stroke of the hone is 76 ft. and power is provided for internal honing up to 30 in. diameter. A push button station and single lever at the operator's position near the middle of the machine provides

control of all movements, including entry of the hone into the hole being finished, automatic rotation and hydraulic reciprocation, hydraulic expansion of the hone to a positive stop for final size, short stroking at any point, and withdrawal of the hone from the work piece. The bed of the machine is of welded steel, carrying accurately aligned ways, and it contains tanks for hydraulic oil, a filtering system and large reservoirs for coolant.

suitable for plain work on parts that need be only drilled, formed and cut off. Usually the stock is fed automatically against the non-rotating drill, then gripped by a cam-operated collet chuck. The drill is then fed into depth by another cam on the chucking cam drum operating through a square bar. Return of the drill spindle is by spring. Modification in depth of drilling may be made by an adjusting screw without changing the lead cam.

Model SM is equipped with three tool slides, two lower horizontal and one vertical above the work spindle. The lower front slide usually carries the cut-off tool; the rear lower slide, the forming tool; and the vertical slide carries a stock stop when a rotating drill spindle is used (optionally extra). All three slides are operated independently by cams at the rear on a common camshaft. Drive is by a 3-hp. motor and pick-off change gears are used to obtain the desired tool feeds and spindle speeds. The work spindle and all shafts in the gear box are mounted on precision anti-friction bearings.

Hydraulic Broaching Machines

AN improved line of horizontal broaching machines is being offered by the Oilgear Co., 1300 West

Bruce Street, Milwaukee, in nine sizes ranging in capacity from 3 to 50 tons normal broaching load and with working strokes from 36 to 72 in.

Each size is equipped with an Oilgear type DX two-way variable displacement, radial piston fluid power pump of sufficient volumetric capacity to provide variable cutting speeds up to 37 ft. per min. and independent return speeds up to 100 ft. per min. Stroke adjustment is obtained through two dogs with needle bearing rollers mounted on a rotary acting control rod in the broach trough.

Through the aid of solenoid operated pilot valves, push button control is used for forward and reverse movement of the ram, with a large mushroom head button for safety stop. An alternative toe lever switch may also be used to control the crosshead movement.

Frames are of welded steel and the trough is of cast steel, fitted with hardened and ground ways. Crosshead is of steel, with replaceable bronze liners. Vertical adjustment is provided the tool puller for keyway and spline work. Hydraulic cylinder is honed and has a closely fitted ring type piston. Base contains ample reservoirs for oil in the fluid power system and for the tool coolant, and encloses all the operating mechanisms. These machines are equally well adapted for both internal and external

MANY universal features for grinding and lapping of cemented carbide, high speed steel and Steelite tools are found in this All-In-One hand grinding and lapping machine made by T.C.M. Mfg. Co.



broaching and have faceplates of ample size to accommodate simple or complex fixtures. Faceplate holes range up to 11 in. diameter and the distance between ways up to 10 in.

Abrasive Cut-Off Machine

A GEARED head motor with offset spindle is used in the universal abrasive cut-off machine recently introduced by the Portman Machine Co., 2236 Bathgate Avenue, New York. Motors may be of 2 or 5 hp., three phase, 3450 r.p.m. reduced to 2300 r.p.m. at the spindle. Either 12 or 16-in. abrasive disks may be used and because of the geared head may be worn right down to the flange diameter. Bearings are of a preloaded duplex type. A direct motor model is also made.

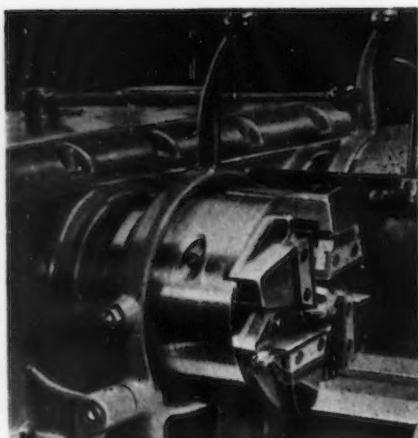
The motor base arm swings 45 deg. either side of center for angle cutting and the 16-in. work table moves with it whereas the cutting fence remains stationary for all working positions. Maximum cutting capacity with 16-in. disk is $3\frac{1}{2}$ x 5 in. and length of cut is about 2 in. on the line of cut. Coolant pump is driven by a separate motor and directs the fluid to both sides of the wheel.

The Portman company is also furnishing a line of geared head motors, from 1 to 5 hp., for driving grinding wheels, lapping and polishing units and drill heads. Helical gears are used in the drive and the spindle is mounted on Fafnir duplex type preloaded bearings for maximum rigidity and precision performance under heavy axial and thrust loads.

Universal Milling Head

TWO types of full universal mill head attachments for application to the round overarm of a plain miller are being marketed by Fray-Mershon, Inc., Glendale, Cal. Type A has no axial feed to the spindle, while type B is provided with a slide and adjustable gib construction, permitting spindle travel of 4 in. The plain type is a belt-driven model with spindle speeds from 600 to 4800 r.p.m., the latter for use with small end mills. A back-gear attachment is also available for heavier operations, with low speed of 150 r.p.m.

Spindle is a hardened chrome-molybdenum steel shaft mounted in heavy duty Timken bearings. Any compound angle is obtained by means of accurate graduations in two planes at right angles to each other. The machine comes complete with adapter to fit the milling machine overarm



A MUCH freer cutting action for tapered threads is obtainable with the new principle of design incorporated in Lanco internally tripped pipe and nipple heads. Existing heads of this type also can be changed over to the new semi-receding type illustrated.

and $\frac{1}{2}$ -hp. motor, with reversing switch optional.

Tool Grinding and Lapping Machine

IT is now definitely established that the life of high-speed steel and Stellite tools can be greatly prolonged by using the same care in the grinding and lapping of the cutting edges as is given to the cemented carbides. A hand grinder known as the All-In-One, has recently been placed on the market by the T.C.M. Mfg. Co., Harrison, N. J., to handle the finishing of all three classes of tool materials. Chief principle of the design is the se-

lection of a motor speed so that with a 6-in. wheel, the peripheral speed is only 2700 f.p.m., low enough to prevent burning or checking of any of these materials, yet not sacrificing too much in the way of production time.

Various wheel combinations are available. Rough grinding of high-speed tools is done on aluminum oxide wheels and polishing on a 400-grit rubber-bonded wheel. Silicon carbide wheels are used for grinding carbide tools and a diamond impregnated metal wheel of high heat conductivity is used for polishing them. A similar type of formed diamond impregnated wheel is available for forming chip control grooves in the top of steel-cutting cemented carbides so that the steel chip is deflected into a coil without undue abrasion on the tool face. Copper disks that are loaded with diamond dust in oil can also be mounted on the spindle for cutting carbide blanks when used in conjunction with a gravity feed type of holding fixture.

The tables at either end of the motor stand have a variety of movements. They have vertical adjustment, allowing the grinding of a tool edge on the centerline of the wheel. By quadrant control they can be tipped 40 deg. from the horizontal, and may be moved to any position around a vertical pintle for grinding either on the face or the periphery of a cup wheel. On the table itself is a protractor, with micrometer feed adjustment.

Tapered Threads Cut With Semi-Receding Die Head

A NEW method has been developed by the Landis Machine Co., Waynesboro, Pa., for the cutting of tapered threads with Lanco internally tripped pipe and nipple heads. The operating mechanism within the head had been redesigned so that as the die head advances under cut, the contact of the reamer with the end of the work will cause the chasers to recede, thus producing a tapered thread. This receding action does not commence until after two or three threads are formed and these initial threads provide a lead nut action for the chasers. The former leadscrew has been eliminated. The manner in which the chasers are applied to the head provides the correct taper for the lead threads. Total length of thread is established through the reamer mechanism and it is possible to adjust the die head for size without affecting the thread length.

A much freer cutting action is obtainable with the semi-receding head,



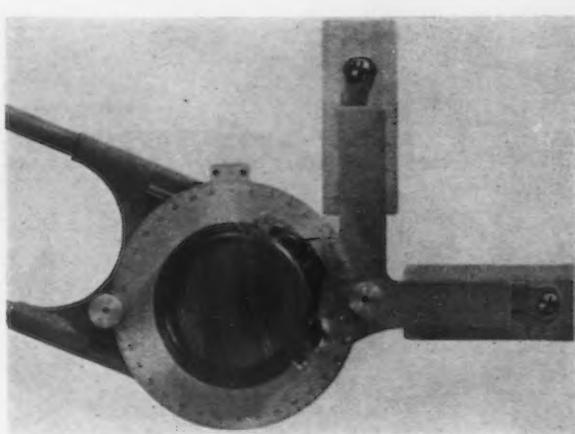
COMPACTNESS and wide flexibility in installation is featured in the No. 240 Brown & Sharpe Motorpump, particularly designed for standard machine equipment where space is limited. A foot mounted motor model, No. 220, has similar characteristics.

which automatically reduces the cutting strain as the head advances, thus reducing power and also increasing the accuracy of the taper.

Coolant Pumps

TWO new styles of centrifugal Motorpumps are announced by Brown & Sharpe Mfg. Co., Providence. Both are designed for operation with impeller below liquid level. The No. 220, not shown, can be mounted in practically any position, either horizontally or vertically, but the motor preferably should be above the pump. A mechanical seal protects the shaft from wear and prevents leakage, without adjustment. The No. 240 Motorpump, illustrated, is similar to the No. 220 but has flange mounting integral with the pump and does not require inlet piping. Discharge port arrangement is the same in both

CLOSE-UP of the protractor head of the new model 77 Universal drafting machine. The full vision, ball bearing protractor is located above the arm, eliminating obstructions and giving greater convenience to the operating levers. The ratchet, which provides automatic stops at 0, 30, 45, 60 and 90 deg. in all four quadrants has an automatic take-up for wear. Wing clamp has been provided with an octagonal, adjustable connection to the clamp screw to prevent slipping. A secondary 360-deg. rotating element, operated by two thumb screws, makes possible the setting of the protractor to any angle of the drawing to form an odd-angle baseline. The streamlined arms completely enclose bands and working parts, minimizing the accumulation of dirt between bands and wheels, besides protecting the draftsman. Precision ball bearings are used throughout. All styles of verniers and graduations can be supplied. Made by the Universal Drafting Machine Co., Cleveland.



models, that is, radially from center of rotor assembly, and its location may be changed with respect to the intake

port by shifting the pump assembly on the motor end bell or at the split in the pump housing.

March Steel Output at 55.63% Against 54.10% in February

PRODUCTION of open-hearth and bessemer steel ingots in March rose to a total of 3,364,877 gross tons, the highest monthly output so far this year, according to the monthly report of the American Iron and Steel Institute.

The March output exceeded the tonnage produced in any month of 1938 except November, when 3,572,220 gross tons was produced.

Total output of 9,506,594 gross tons in the first quarter of 1939 was 75 per cent more than the tonnage produced

in the first quarter of 1938 and was only 3 per cent less than the fourth quarter of 1938 which was the best quarter of that year.

The tonnage of ingots produced last month was 14 per cent above the February total of 2,954,883 gross tons, and exceeded by 67 per cent the March 1938 output of 2,012,406 gross tons.

Rate of operations in the industry during March was 55.63 per cent of capacity, as against 54.10 per cent in February and 33.85 per cent in March a year ago. Operations for the first quarter of this year averaged 54.14 per cent of capacity, compared with 55.77 per cent in the fourth quarter of 1938, and 31.58 per cent in the first quarter of last year.

G-E Employee Benefit Fund to Be Explained

AN explanation of the General Motors Corp. Employee Benefit Fund for 1939 was to be given before members of the Society for Advancement of Management at the Toledo Chapter meeting, Thursday, April 13, with members of the Detroit Chapter cooperating. Mr. Ralph L. Lee, of the Public Relations Division of General Motors, will be the speaker and Prof. Frank D. Moore, College of Business Administration at the University of Toledo, is the chairman. The meeting will be held at the New Secor Hotel, Toledo.

PRODUCTION OF OPEN-HEARTH AND BESSEMER STEEL INGOTS
(Reported by Companies Which in 1936 Made 98.29 Per Cent of the Open-Hearth and 100 Per Cent of the Bessemer Ingots)

1938	Reported Production (Gross Tons)		Calculated Production All Companies		Per Cent of Capacity
	Open-Hearth	Bessemer	Monthly	Weekly	
January	1,604,363	99,991	1,732,764	391,143	4.43
February	1,550,772	125,493	1,703,726	425,932	4.00
March	1,822,398	157,737	2,012,406	454,268	4.43
1st Quarter	4,977,533	332,221	5,448,896	423,709	12.86
April	1,762,315	131,644	1,925,166	448,757	4.29
May	1,647,049	130,590	1,806,805	407,857	4.43
June	1,493,148	118,688	1,638,277	381,883	4.29
2d Quarter	4,902,512	330,922	5,370,248	412,778	13.01
1st 6 Months	9,880,045	764,143	10,819,144	418,212	25.87
July	1,821,815	127,982	1,932,053	448,429	4.42
August	2,309,306	196,789	2,546,988	574,941	4.43
September	2,407,233	207,887	2,657,748	620,969	4.28
3d Quarter	6,538,354	532,658	7,186,794	547,357	13.13
9 Months	16,418,399	1,296,801	18,005,938	461,691	39.00
October	2,844,353	223,208	3,117,934	703,823	4.43
November	3,312,319	201,246	3,572,220	832,685	4.29
December	2,932,279	158,965	3,143,169	711,124	4.42
4th Quarter	9,088,956	583,419	9,833,323	748,350	13.14
Total	25,507,355	1,880,220	27,839,261	533,933	39.79
1939					
January	2,986,455	147,494	3,186,834	719,376	4.43
February	2,710,696	196,186	2,954,883	738,721	4.00
March	3,115,022	194,694	3,364,877	759,566	4.43
1st Quarter	8,818,173	538,374	9,506,594	739,237	12.86

Characteristics of Hydraulic Drive

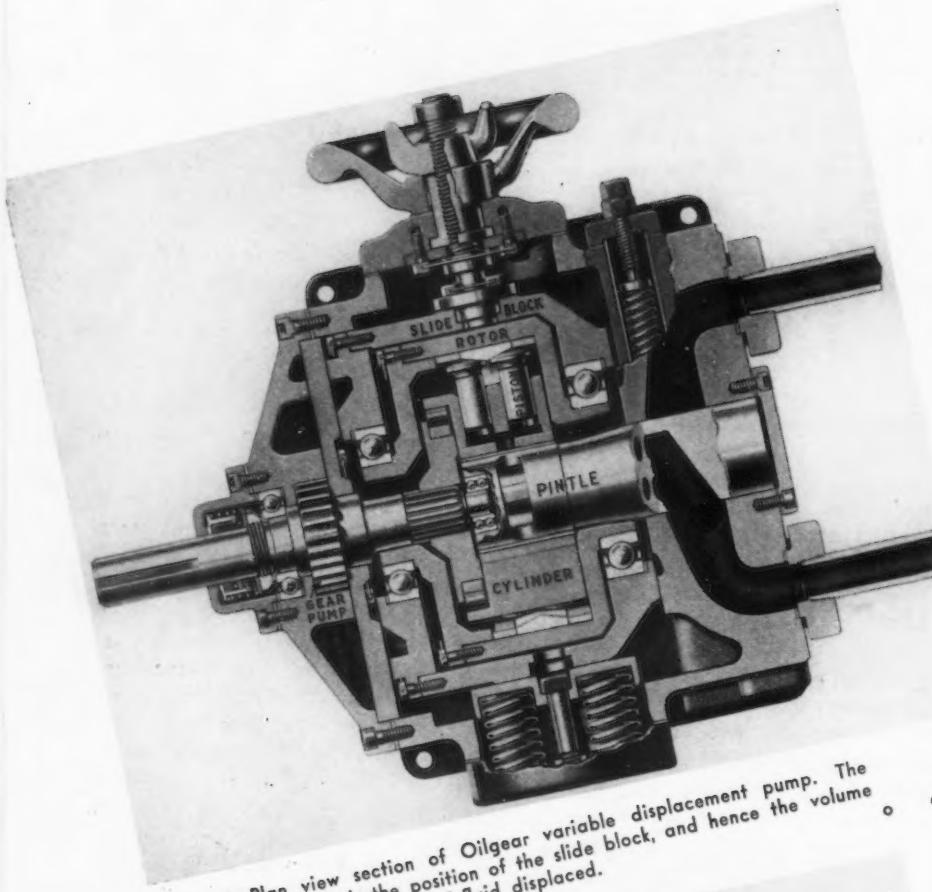


FIG. 1—Plan view section of Oilgear variable displacement pump. The hand wheel controls the position of the slide block, and hence the volume of fluid displaced.

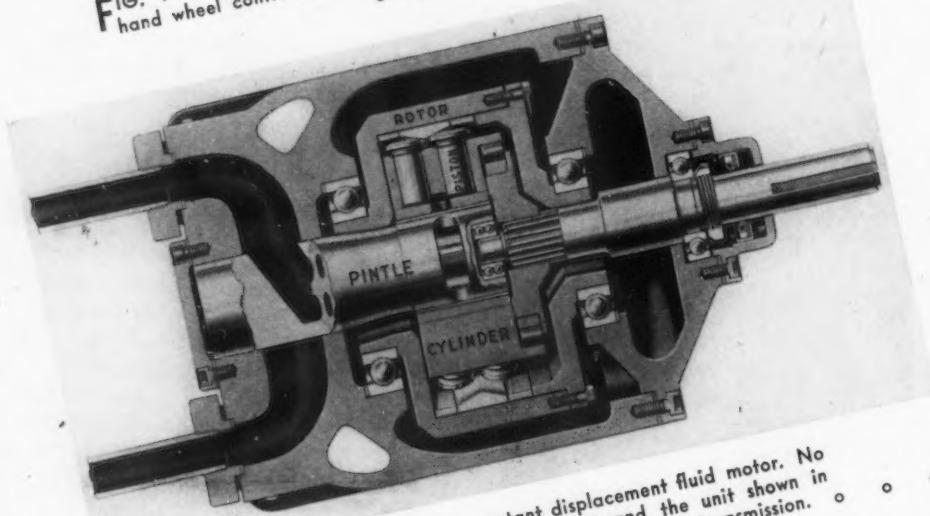


FIG. 2—Plan view section of Oilgear constant displacement fluid motor. No adjustment of rotor position necessary. This unit and the unit shown in Fig. 1 when taken together make up a complete hydrostatic transmission.

CHAPTER 40 of a Series on
the Methods and Equipment
of Industrial Power
Transmission.

THE basic characteristics of all hydraulic drives center around the fact that there is no mechanical connection between the input shaft and the output shaft. As the name implies, the connecting medium is a fluid; and this fluid is usually oil.

Now oil is practically incompressible. Consequently, since there can be no resiliency in that which is incompressible, it would be natural to classify hydraulic drives in the *positive* category. (See Chap. 18, "A Simple Classification of Mechanical Power Transmission Equipment"). But the flow of the fluid medium in any hydraulic drive may be so controlled that, paradoxically, such a drive becomes one of the best pieces of shock-absorbing equipment in the whole range of power transmission apparatus. As a consequence, while hydraulic drives are not resilient in the same sense as belting drives, because of this shock-absorbing characteristic, they must properly be classified as *resilient* drives.

Two general types of hydraulic transmissions are in successful use in the United States today. The one common factor in both types is the use of a light mineral oil as the working medium. Aside from that the two systems are radically different; for in the one the transmission of power depends upon the *pressure* of the liquid discharged by a pump against the pistons of a fluid motor, while in the other it depends upon the *quantity* and *velocity* of the liquid discharged by an impeller mounted on the driving shaft, against the vanes of a turbine

Transmissions . . .

By FRANCIS JURASCHEK

runner mounted on the driven shaft. In the first system the driving and driven shaft may be, but seldom are, projected in one continuous line; in the second case, since the impeller and the runner must be concentric, both shafts must lie in the same line.

In a widely-known paper presented before the Institution of Mechanical Engineers (England) in 1935, the British authority, Mr. Harold Sinclair, suggested the use of the terms "hydrostatic" and "hydrokinetic" to differentiate the two systems. This suggestion appears to be so apt that it has come into general use, and will be employed here. Typical of the hydrostatic systems is the Hele-Shaw method of drive, of which the Oilgear, the Waterbury, the Watson-Stillman and the Vickers systems are variations; and typical of the hydrokinetic systems are the Vulcan-Sinclair fluid couplings, the Voith system torque converters, and the Lysholm-Smith torque converters.

Certain characteristic advantages are common to both the hydrostatic and the hydrokinetic systems, since there is no mechanical connection between the driving and driven shafts. Torsional vibration is effectively damped out, and the driven mechanism is thus kept free of any tremors inherent in the driving mechanism. Overloads on, or temporary stalling of the driven mechanism, will not cause the driving mechanism to stall, since in the hydrostatic system an excess of pressure automatically bypasses the fluid, and in the hydrokinetic system slip is automatically increased. Both systems are adapted to provide close control of heavy-load starting of the driven mechanism from a constant-torque source of power, and both systems provide a high factor of safety against the danger of breakdown due to sudden stoppage or severe overload. Finally, both systems may be adapted for use as variable speed drives, although the hydrokinetic system is said to be superior in high-speed, high-power operation, and the hydrostatic system

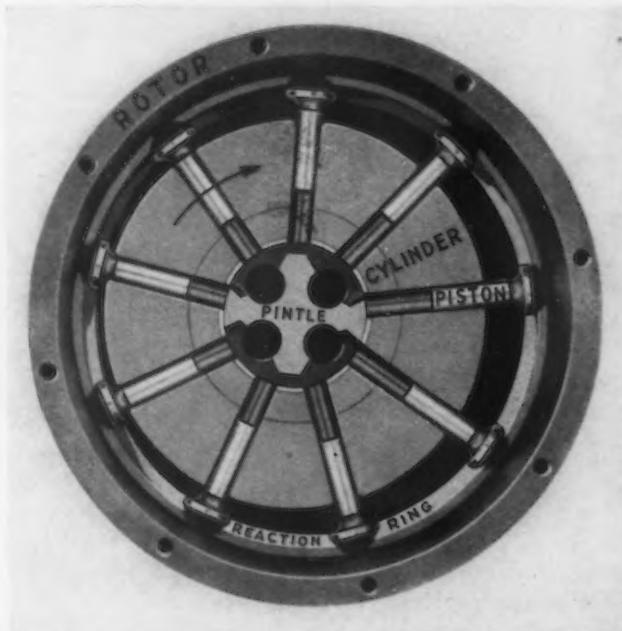
better for large ratios of speed reduction.

Hydrostatic Drives

In general, hydrostatic drives consist of four elements: (1) a constant or variable displacement fluid motor, driven by the fluid discharged from (2) a volumetric variable displacement pump, through (3) the system of piping which delivers the oil from

Second, such a system permits of stepless volumetric speed control, irrespective of the pressure required to drive the fluid motor, since the pressure of the liquid discharged by the pump may be varied at will. Third, one pump, centrally located with respect to the controls, can be made to serve several motors. Fourth, the leakage of the high-pressure working

FIG. 3—The radial rolling piston power unit of the Oilgear hydraulic drive. The eccentricity of the rotor determines the piston stroke and hence the volume of fluid displaced.



the pump to the motor and returns it back to the pump, and (4) a means of control of the pressure of the fluid and its direction of flow.

It is apparent that there are several important features inherent in such a system. First, the pump and the motor do not have to be located together. In fact, in most installations they are not; and many cases are on record where successful installations have been made in which the pump is separated by as much as 50 ft. or more from the motor. Because of this fact, the driven shaft may be set at any angle with respect to the driving shaft.

fluid between the running fits of the pistons, cylinder barrels, etc., of both pump and motor, provides self-lubrication. This also reduces the effective displacement of the pump as expressed in terms of actual revolutions of the motor, thus constituting one of the losses which determine the overall efficiency of the drive.

These features may be summed up in the statement that the system as a whole is a power transmitting method of extraordinary flexibility.

To the features of such a system which permit its ready adaptation as a means of securing variable speed driving should be noted the equal and

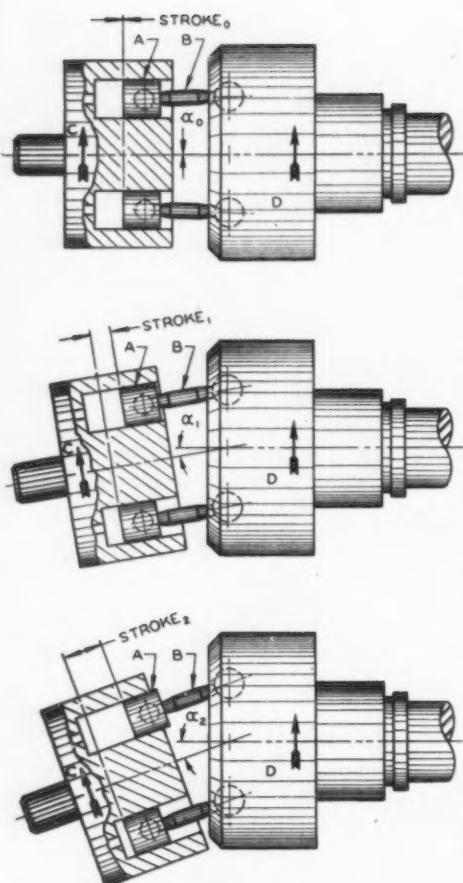


FIG. 4—Scheme of variable stroke operation of Vickers multiple piston fluid pumps and motors. Tilting the cylinder block alters the length of piston stroke.

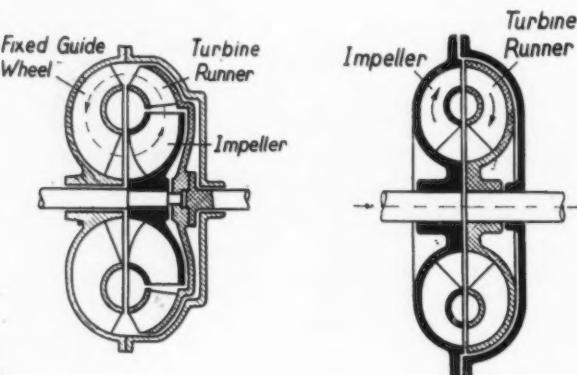
opposite fact that the system is essentially an automatic means of maintaining constant speed for any speed at which the controls are set (within the usual variations of speed of normal operation of the driving mechanism). An electric motor, for instance, when directly connected to a driven mechanism, will vary in speed as the load changes. Even when driving a constant load there may be variations of speed of the motor due to line-voltage changes, as when a number of other motors on the line are started under load. Fluctuations of speed may be even more pronounced in an internal combustion engine. But with a hydraulic transmission interposed between the power source and the final application of the power, both speed and torsional vibrations are smoothed out effectively. This is of the utmost importance in the driving of such equipment as a paper-making machine, where the several sections must be coordinated in speed, and the speed of each section maintained uniformly, to avoid breaking the web. In this connection it should be noted that completely auto-

matic speed control may very easily be added to such a hydraulic transmission, so that variations in working pressure may be compensated for by induced changes in the speed of the transmission.

Two types of pumps may be used in a hydro-static system; variable displacement or constant displacement. Likewise, the fluid motors may be, respectively, of two types, constant and variable displacement. For the use of power from a rotary shaft, both pump and motor are required; but a pump alone may be used to produce motion in a linear direction, as in machine tool feeds and in hydraulic presses. In fact, hydraulic drives of the hydro-static type are equally adapted to produce rotary or reciprocating motion. In rotary motion transmission, a constant displacement pump is used with a variable displacement motor to secure constant power output, while a variable displacement pump and a constant displacement motor produce

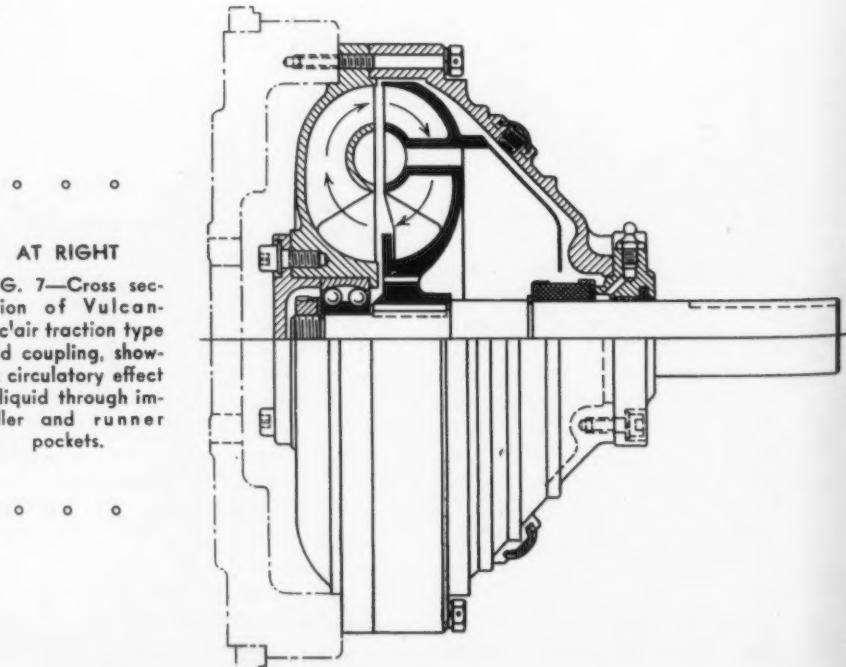
constant torque output. Essentially the advantages inhering in the application of a hydro-static system drive may be summed up thus:

Smooth, uniform acceleration, combined with even, positive speed, practically unaffected by variations in load. Convenient and accurate control of speeds, steplessly variable throughout the entire speed range in either direction. Flexibility of location of the transmission units, with remote control, either manual or automatic. High efficiency, coupled with the use of power only in proportion to the work performed. Automatic overload protection. Low maintenance costs, due to the simplicity of design and automatic lubrication of all moving parts. Standard speed, general purpose electric motors may be used instead of variable speed motors. The driving and driven mechanism may lie together in one straight line, or be placed at any angle with respect to their shafts, or separated by con-



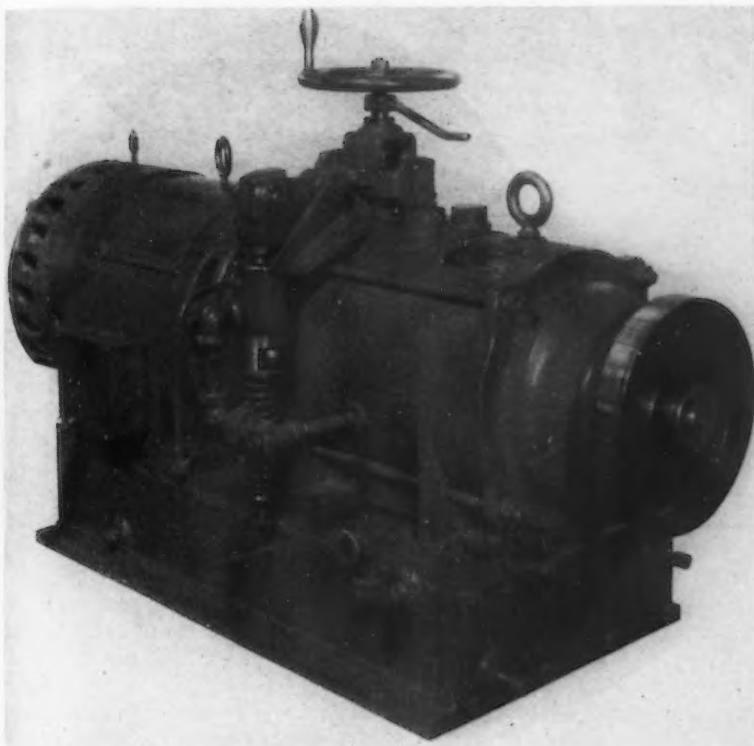
AT LEFT

FIG. 6—Sketch to show relationship of elements of a hydraulic torque-converter (A) as compared to the elements of a fluid coupling (B). (Courtesy of J. M. Voith Engineering Works, Germany.)



AT RIGHT

FIG. 7—Cross section of Vulcan-Sinclair traction type fluid coupling, showing circulatory effect of liquid through impeller and runner pockets.



ABOVE

FIG. 5—An American Engineering Co. Hele-Shaw hydraulic transmission unit complete and self-contained, consisting of a built-in, direct-connected electric motor, pump, fluid motor, oil reservoir and controls.

• • •

AT RIGHT

FIG. 8—Cross section of Vulcan-Sinclair scoop tube type fluid coupling for variable speed drive, showing the flow of oil in relation to the oil reservoir and scoop tube controls.

siderable distances. Torsional vibrations are effectively damped out.

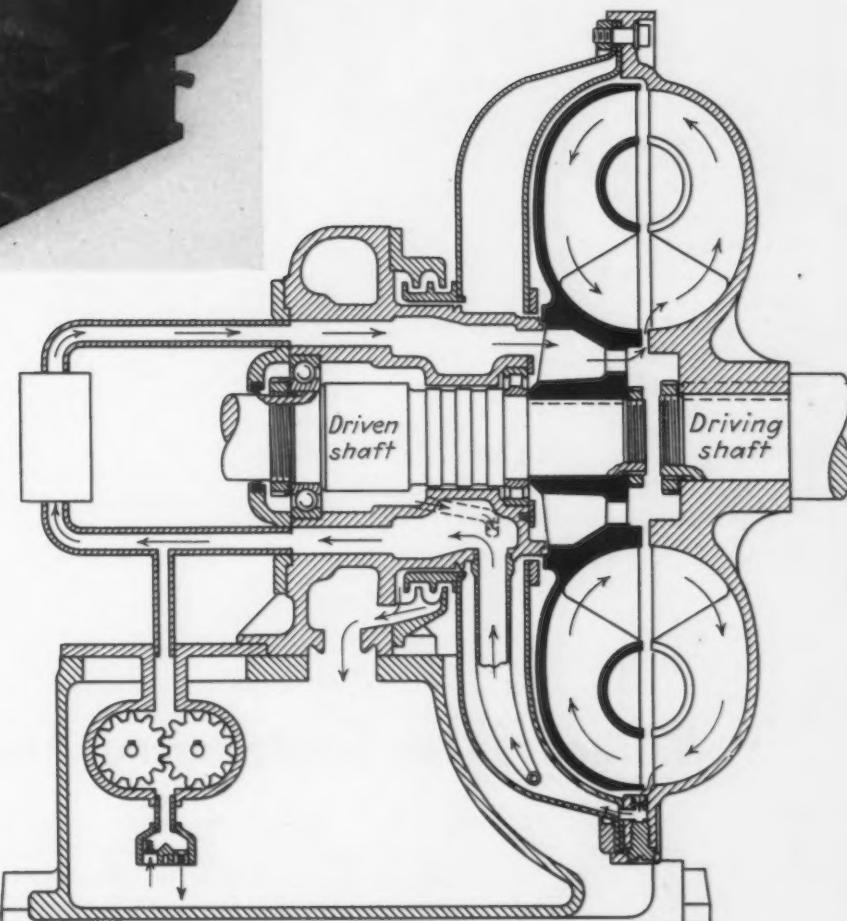
Hydrokinetic Systems

Here a differentiation must be made between two separate developments of the turbine impeller-and-runner method of hydraulic power transmission—the torque converter, and the fluid coupling. The fundamental difference between the two is, that in the hydraulic coupling the impeller and the runner work directly together without the interposition of a guide wheel or reaction member, while a torque-converter requires stationary guide vanes to deflect the fluid flow, usually as a means of obtaining a higher torque at a correspondingly

lower speed of the output shaft. The output torque of a converter is determined by the shaping of the blades, by the quantity of the circulating liquid and by the driving shaft speed. The output torque of fluid coupling is always exactly the same as the input torque; the speed of the output shaft varying from about 20 per cent to about 98 per cent of the input shaft speed.

It will probably be of advantage here to describe a typical torque-converter before getting into the subject of hydraulic couplings, for the reason

that the development of the coupling has been largely through the search for an efficient converter. A torque-converter is a device which, through a change in speed, increases the rotational effect of the output shaft as compared with the rotational effect of the input shaft. The most common example of such a device is the gear-change box of an automobile. Here the high-speed torque effort of an engine is transformed into various lower-speed, increased-torque efforts of the drive-shaft, to facilitate the operation of the vehicle under starting or heavy grade conditions.



The fluid torque converter consists of a turbine impeller acting as a pump, a set of vanes to deflect the flow of the liquid pumped, and a runner upon which the pumped liquid acts, and which in turn sends the fluid back to the impeller. The impeller being fastened to the input shaft, rotation of that shaft causes the liquid contained in the device to flow outward toward the periphery of the impeller by the action of centrifugal force, and thence, due to the curvature of the impeller blades, across and through the stationary guide

vanes to the runner, which receives the liquid and by reason of the shape of its blades causes that liquid to flow inward toward the shaft and thence through the guide vanes back to the impeller pockets. (See Fig. 6A.) The runner is fastened to the output shaft of the device; thus the rotation of the input shaft and its impeller forces the circulating liquid to make the runner and its output shaft rotate in the same direction.

Now, manifestly, the speed of rotation of the output shaft depends upon two factors; (1) the amount of liquid contained in the pockets of both impeller and runner, and (2) the force with which that contained liquid circulates around from the pockets of the impeller to the pockets of the runner and back. When the input shaft is put in motion, the output shaft being at rest and connected to a load, there will be little circulatory effect, until the speed of the input shaft builds up the centrifugal force necessary to cause this circulation. Consequently there is a high degree of "slip" in the device at starting, which cushions the shock perfectly. When the impeller gathers speed the circulation of liquid from impeller to runner pockets builds up, and its "drag" on the runner increases until at full speed and load the runner rotates with less and less slip.

In the torque-converter the station-

ary guide vanes deflect the circulation to whatever degree may be desired to cause the runner to rotate at a given speed ratio as compared with the impeller, and with a correspondingly increased torque effect. But it was found that when these guide vanes were eliminated, a coupling was had in which the torque of the output shaft always remained the same as that of the input shaft, and in which, at full load and speed, the slip between input and output shafts could be held to approximately 2 per cent. In this way the foundation was laid for the development of three types of fluid couplings, each specifically suited to certain uses.

In the fluid coupling proper (the "traction" coupling) there are but three essential parts; the impeller attached to the input shaft, the runner attached to the output shaft, and a liquid reservoir or casing fitting over the impeller for the purpose of keeping the amount of liquid stable in the operating parts. By adding to these a scoop tube which may be set in various positions in the plane of the impeller, more or less liquid may be maintained in circulation in the operating parts, and thus the coupling is adapted for variable speed transmission purposes. Or, an annular ring valve may be introduced between the impeller and the runner to reduce residual or "drag" torque to a low value when the output shaft is stalled.

These three types of fluid couplings (traction type, scoop tube type, and ring valve type) make up a line of hydro-kinetic power transmission devices which have certain specific features. These may be summed up briefly as follows:

First, they cushion shock loads and starting loads perfectly, and do not transmit any of the torsional vibration from the power source to the driven mechanism. Acceleration of the output shaft is smooth and uniform under all conditions of operation. The load may be stalled completely without stalling the power source (electric motor, steam or internal combustion engine, or waterwheel). Fluid couplings are, of course, self-lubricating. Under certain conditions the heat generated by the circulatory flow of the liquid within the device may require the addition of an oil-cooler for successful operation. In extremely compact form it provides an efficient variable speed method of operation. The device provides within itself only "straight-line" operation; that is, both input and output shafts must lie in the same straight line, and the one be in effect a continuation of the other, but the output shaft may of course be coupled to a gear for angle drives.

(The next chapter in this series will continue this discussion and take up the subject of the application of hydraulic drives.)

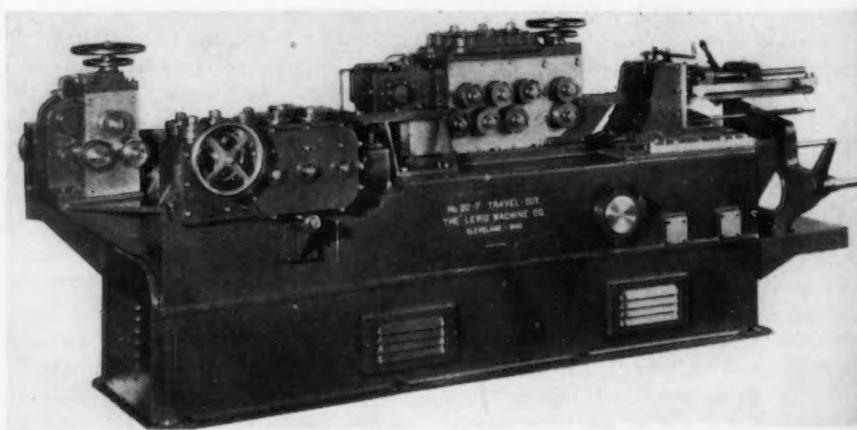
Bar and Shape Straightening And Cutting Machine

TO its line of round wire straightening and cutting machines, the Lewis Machine Co., 3441 East 76th Street, Cleveland, has added the No. 20-F Travel-Cut shape straightening and cutting machine designed to handle square, flat, hexagon and shaped rod. It has a capacity up to $\frac{5}{8}$ in. square or equivalent and flats up to $2\frac{1}{2}$ in. wide.

The rod is taken from the coil, run through the three roll preliminary flat straightener, is passed through the two horizontal feed rolls and six edge straightener rolls and then through six flat straightener rolls. The rod is then guided through the cut-off head, of the flying shear type, which travels with the rod while it is being gaged and cut. This design is said to produce rods free of roll marks.

All rolls are power driven and a total of 84 anti-friction bearings are used throughout the drive. All main drive units, including flywheel, clutch and cut-off mechanism, are fully en-

closed in oil-tight housings, as are the alloy steel, heat-treated gears. Drive is by V-belt from a 30-hp. motor mounted in the steel base. An oil pump provides lubricant to vital parts.



Dowmetal Gravity Conveyors



Speed Handling of Express

LAST holiday season at the Jacksonville, Fla., railroad terminal the Railway Express Agency expeditiously handled more than 2500 carloads of express matter with the aid of experimental sections of Dowmetal conveyors. These magnesium alloy conveyors replaced the heavy steel conveyors previously used. In these experimental sections the rollers, the through shafts and the 3-in. side rail with extruded channels were all made of Dowmetal. The accompanying photograph shows a 10-ft. and a 13-ft. section, as set up in a box car. Note the carrying handles on the side rail of the conveyors.

After an extended series of tests, it was concluded that the development would be useful in many operations, such as loading and unloading to and from cars and street vehicles, and in sorting express matter for different destinations or consignees. They all proved to be profitable applications, both in expediting the handling of express shipments and in lightening the physical labor of the employees.

To date more than a half mile of these portable conveyors, in 10-ft. and 13-ft. lengths, constructed of Dowmetal, are in operation at Railway Express Agency terminals at New York, Chicago, Los Angeles, San

Francisco, St. Louis, Atlanta, Washington, Boston, Houston, Jacksonville, Louisville and Hollywood. At the Jacksonville terminal alone, 50 sections in 10-ft. lengths and 20 in 13-ft. lengths are in daily use.

Metallic Lead Paint Protects Metals

LEAD has long been used for protective purposes in various forms, as for instance white lead and red lead. The uses of lead as protective films are equally recognized, as for example lead burning and terne plating. With these applications in mind, the C. M. Dragert Co., 237 India Street, Brooklyn, has developed a product called Chromlead, which consists of a metallic lead paste as the pigment and chromized oil as the vehicle. The Chromlead paste is a flaked lead, leafed in chromized oil.

The vehicle is said to be unique in that it carries chromium-chromate in solution, and contains no soap and is not an emulsion. The product is

claimed to present an excellent anti-corrosive film on any of the ferrous or non-ferrous metals. This protection comes from both the leafing of the lead and also a measure of surface de-hydration.

The paint will contract and expand with the metallic surface, may be secured for air-dry or baking, and dries dust-free in 30 min. Colored finishes may be applied over the Chromlead, and the material covers about 200 to 400 sq. ft. per gal. It is used on partitions, switch boxes, cabinets, tool boxes, ventilating systems, chemical machinery and equipment, steel sash, etc.

THIS WEEK

ON THE

By W. F. SHERMAN
Detroit Editor

ASSEMBLY LINE

. . . Auto output gains slightly, but manufacturers watch sales closely . . . Hand-to-mouth buying restrictions less severe in Detroit during March . . . Crosley car production plans being pushed.

DETROIT—Output of automobiles recovered slightly last week, regaining about 1000 of the 3000 units that were lost in production of the previous week. The gain, attributed principally to the activity of Willys and of some of the truck manufacturers, is encouraging but not particularly significant. Ward's estimate of total production for the week is 87,019 cars and trucks, compared with 85,980 the previous week and 57,284 in the comparable week a year ago.

Automobile manufacturers are watching incoming sales closely and saw some improvement in the last 10 days of March, but it was frankly admitted during the past week, in the throes of trying to figure out what had upset the industry, that many dealers

in their enthusiasm early in March had overstocked. This inventory situation is not considered at all serious but will be a factor to reckon with.

Because spring automobile production has failed to reach the heights which were expected earlier, there has been a sharp retrenchment on the part of the major steel producer in this area. Late last week Great Lakes Steel Corp., which had been operating 12 of its 16 open hearth furnaces to produce steel mostly for the automobile industry, reduced its operation to 50 per cent of capacity and now has only eight furnaces pouring steel.

Automobile production has failed to climb to the levels predicted for April and this failure is being generally blamed now on such external forces as war scares and stock market weakness.

Despite the somewhat mixed influences which prevail, the monthly survey of industrial purchasing agents has shown a moderate improvement in their attitude, with a further improvement due in the normal course of events.

Some Sales Totals Higher

For those interested in knowing the exact trend of automobile retail sales, the following will be of interest:

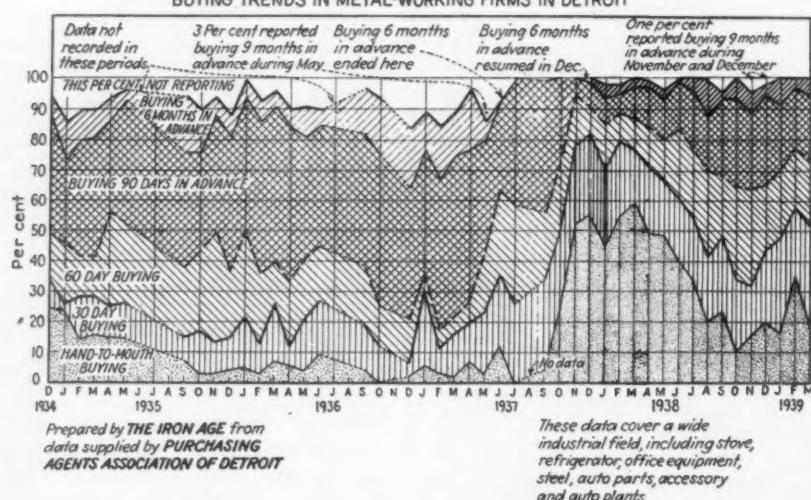
Chevrolet dealers reported a sharp upturn in the last 10 days of March, sales for the period reaching the peak total for any similar 10-day period since the new model introduction and making March, by long odds, the highest sales month. The total was 88,836 units as compared with 50,750 in February and 62,880 in March of last year. The percentage increase over the preceding 10-day period was 70.1; over March, 1938, it was 41.2 per cent; and over February, 1939, it was 75 per cent.

Ford reached the largest volume since July, 1937, sales in March totaling 75,345 units, a 56 per cent gain over March, 1938. In the last 10 days of March sales were 36,874 (nearly half of the month's total) and this was more than 135 per cent better than the volume sold during the similar period in February, 54 per cent better than the volume sold in the previous 10-day period in March. This is significant: both Ford and Chevrolet reports stress the fact that there has been no appreciable increase in used car stocks, despite the increase in new car sales.

Buick reports that about 50 per cent of its sales for the month were made in the last 10 days. Total deliveries for the month were 20,959, of which 9428 were in the final 10-day period. March gained 65 per cent over February, and 35.28 per cent over March, 1938.

The Detroit area is the producer of a large number of consumer items besides automobiles. Most important on the list of metal goods are such things

BUYING TRENDS IN METAL-WORKING FIRMS IN DETROIT

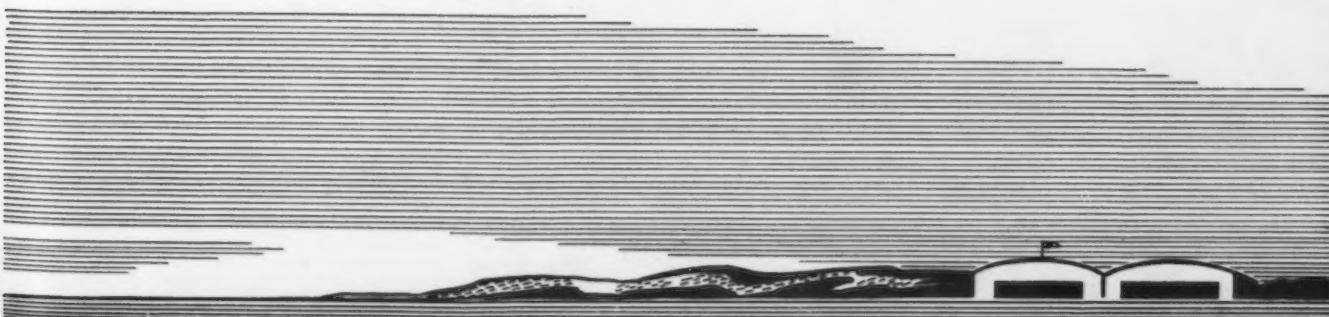


REACHING AN OBJECTIVE



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as refrigerators, stoves, household heating plants, etc. These goods have felt the effects of a sharp upturn, fostered in part by house building programs which have been active, not only in Detroit, but in almost every other city.

Because sales of these consumer goods showed improvement, industrial purchasing agents bought in somewhat greater quantities during March and abandoned their strict hand-to-mouth buying policy in favor of a somewhat more liberal trend. However, the improvement recorded was not very great, since most of the buying has been extended only as far as the thirty-day limit. According to the Purchasing Agents' Association of Detroit, hand-to-mouth buying decreased from 36 per cent in February to 19 per cent in March.

Those who abandoned the "cards-close-to-vest" position changed enough to put 33 per cent of the buying within the 30-day range, compared with 22 per cent a month earlier. A glance at the chart accompanying the Assembly Line will show for February that a total of 58 per cent of the purchasing

was being done some place in the range between 0-58 per cent; now, only 52 per cent of the buying is restricted within this range. Interesting development is the increase of buying on a six months' basis from only 3 per cent to 6 per cent. Continued improvement in these figures should normally come during the next few months as automotive buyers prepare for the 1940 season.

Murray to Make Bodies for Crosley Car

Following official announcement that Crosley Mfg. Co. would produce a new automobile (page 73, April 6, 1939, IRON AGE), comes the word that Murray Corp. of America is calling men back to work and is making plans to produce bodies for the new car. Production is expected to get underway in a few weeks. The engine for the new car is a horizontal, two-cylinder, air-cooled type which will develop an estimated 20 to 25 hp. It is very compact and resembles an oversized motorcycle engine. An entirely new sales organization through the country is expected to be set up to sell this car.

It is understood that Crosley radio and refrigerator dealers and distributors turned thumbs down on the project some time ago because they didn't consider the automobile compatible with their line of goods.

Foreign Agents Active

Because the world naturally turns toward Detroit when it thinks of automobiles, a technical commission representing Autostroy, the Russian automobile organization, is reported to be active in the city, with plans to purchase equipment for Russian automobile manufacture. Detroit has been host to these buyers before, Russia, Italy, Japan and other countries frequently sending delegations here to investigate production methods and to place orders for machinery.

B. H. Anibal, chief engineer of Pontiac Motor Car Co., just finished some interesting pencil work which reveals that the average length of service for the 217 employees on the staff of the Pontiac engineering department is 9.86 years. Anibal and his staff of 16 executive engineers beat all other groups in the department with an average of 13.9 years service each. Adding up all the years of service, Anibal found that 21 centuries of engineering experience are concentrated in the department. Actually, records show 2140 total years of service. These engineers averaged six and one-half years of engineering experience in the principal automobile plants of the country before they joined Pontiac. Next to the executive engineers in terms of service are 14 members of the dynamometer department whose average is 11.7 years. The experimental machine shop's 38 veteran machinists average 11.3 years. In this group is the company's oldest employee, Joe Frechett, experimental blacksmith, who joined the company 32 years ago. Anibal, himself has been with the department for 14 years.

The "chief" set out to show how valuable his engineers were. A survey indicated that more than 90 vitally important engineering improvements have been developed or pioneered by his group, in addition to the hundreds of detailed improvements which they have made. Members of the department have taken out a total of 94 patents on features they have designed. Anibal heads the list of patentees with 13 inventions to his credit.

Other engineers the world over will be lured into some sliderule operations by these figures and by Anibal's statement that in the course of a year 23

(CONCLUDED ON PAGE 79)

THE BULL OF THE WOODS

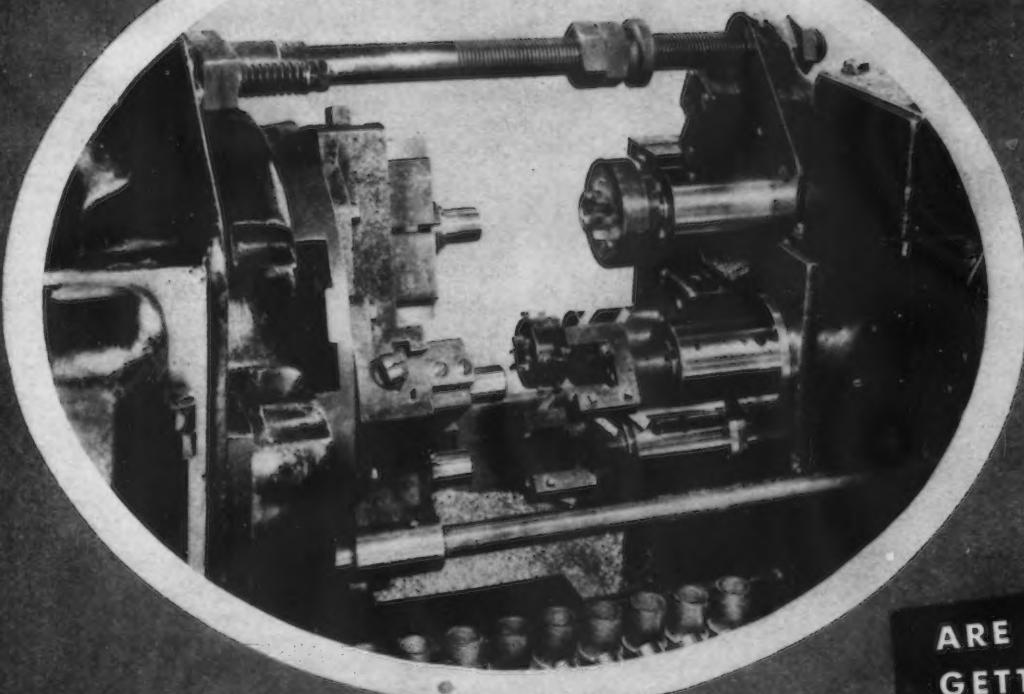
BY J. R. WILLIAMS



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**COMPLETE MACHINING (EXCEPT THREAD CUTTING) OF $\frac{3}{4}$ "
RED BRASS TAIL PIECE (TWO CHUCKINGS, 1ST ILLUSTRATED)**

TOOL PERFORMANCE DATA

	Former Tools	Carboloy Tools
SPEED (R.P.M.)	330-450	Same
FEED	.014"-.019"	Same
MACHINE OUTPUT PER HOUR (Production Job)	119 (Average of 2 chuckings)	211
DEPTH OF CUT	1/32"-5/32" .010"	Rough Same Finish Same
NO. PIECES PER GRIND—1st Chuck	250	6000* 6000*
2nd Chuck	250	9000* 9000*

(*To Date)

Machine used: GOSS & De LEUW 5-STATION AUTOMATIC.

Approximate cost of 27 Carboloy Tools for both chuckings: \$73.93.

Carboloy tools paid for themselves in approximately 16 9/10 operating hours.

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THIS WEEK IN WASHINGTON

...Wagner Act revision unlikely if Congress quits before June 30 . . . AFL wins Senate committee's approval of prevailing wage clause for housing . . . Wheeler-Truman Bill commodities clause considered drastic step by some witnesses.

• • •

By L. W. MOFFETT
Washington Editor, The Iron Age

• • •

WAshington — The possibility of Congressional action this year in the direction of Wagner Act revision as sought by the AFL was seen this week to be hinging almost entirely on the length of the present session with the odds running heavily against favorable action if the session is not prolonged beyond June 30, a date advanced by some members as the earliest adjournment date.

It is viewed as likely that the tendency in the Senate Labor Committee will be to delay possible amendments and that favorable action on the House side is much more certain. Some observers express the view that were a vote to be taken today in both Houses the Senate would turn down any changes in the law while the House would vote for revision along the lines proposed by the AFL.

That there is a growing sentiment in both Houses favoring revision is apparent and that public hearings, while not important in themselves, may serve to crystallize sentiment and change the opinion of some Congressional members who are now straddling the issue. It is understood that there are a large number of industrial spokesmen who have asked to testify

and that their story may go a long way toward influencing public opinion.

Board Reported Balking

Some stories circulating in Washington are to the effect that a certain amount of resentment on the part of members who heretofore stood solidly behind the National Labor Relations Board is developing presumably because the board recently turned down a reported request to rewrite regulations governing its administrative procedure. Some reports have it that the White House and Senator Robert F. Wagner, co-author of the law which bears his name, had put some pressure on the board for such a rewriting but that the NLRB had demurred.

Factors tending to relegate the Wagner Act question to the background include the current hearings on neutrality legislation being conducted by the Senate Committee on Foreign Relations, three of whose members are also on the Labor Committee, and the pending bills involving changes in the Walsh-Healey Public Contracts Act and the Fair Labor Standards Act.

The collapse of peace negotiations between the AFL and the CIO are expected to tip the scales in favor of revision as proposed by the AFL. Hearings originally scheduled on the pending bills to amend the law were called off several weeks ago because of fears expressed in the Senate Labor Committee that the sessions might impede the progress of peace negotiations. Under increased pressure from industry and from Congressional members however a hearing date was fixed. Also a contributing factor, according to some reports, was the reputed attitude assumed by John L. Lewis at the peace conferences that he had the power to start or stop a Congressional hearing at will. Government participants in the negotiations were understood to resent that expression and promptly communicated with the Capitol, requesting the committee to proceed with the hearings as previously planned. Shortly thereafter the AFL-CIO meetings were called off.

Inquiry Threat to NLRB

One reason advanced as to why greater progress can be expected in the House in the direction of revising the law is the so-called Anderson resolution which would authorize an investigation of the NLRB and bring about a house-cleaning of the present setup. Whenever there were signs of any delay in the House the resolution has served as a club to bring those following dilatory tactics into line.

Another proposal for investigating the labor board was made in the House last week when Representative Cox, Democrat of Georgia, and ranking member of the House Rules Committee, cited NLRB cases involving the Weirton Steel Co., the Ford Motor Co., and Fansteel Metallurgical Co., as examples of "rather flagrant conduct on the part of trial examiners and board attorneys in the badgering of witnesses and in the effort to prevent attorneys for respondents from making proper records."

Cox told the House that the board's functions have been "maladministered

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That means the extreme contrasts that exist between bright and dim areas may cause eyestrain . . . slow up production . . . increase operating errors . . . and constitute accident hazards. Seeing is difficult because workers' eyes are continually trying to adapt themselves to the many lighting conditions in the working area.

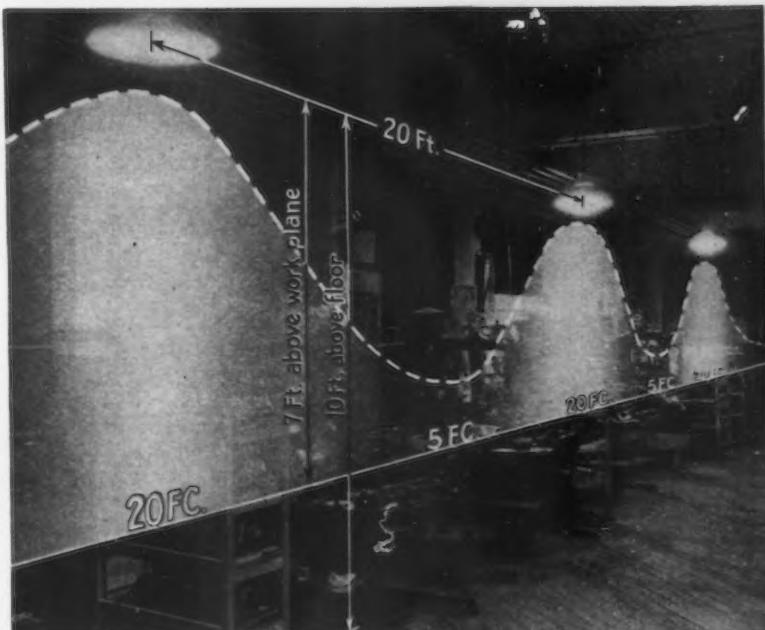
You can easily tell whether the light in your plant is uniform or not by measuring it in footcandles beneath and between light sources with a G-E Light Meter.

In general, direct lighting units should be spaced no further apart than their height above the floor. Where supplementary lighting is required, general lighting should also be used.

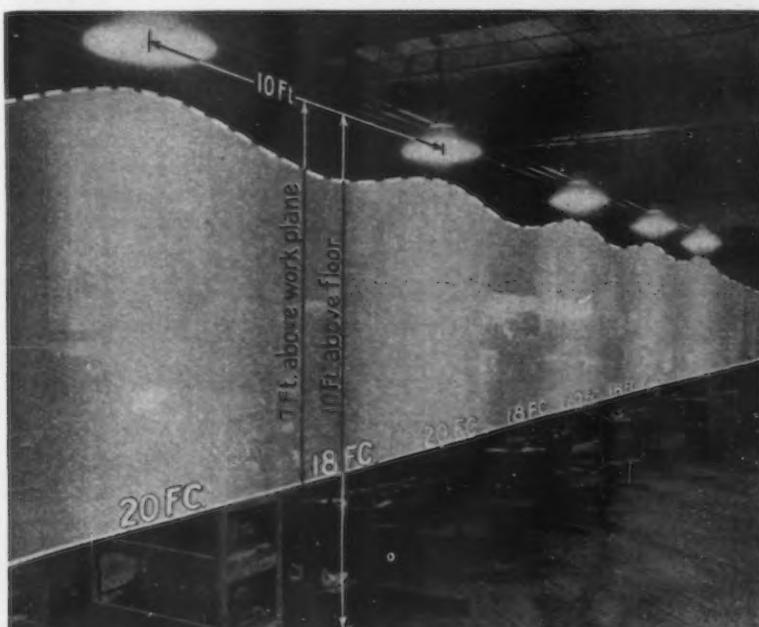
Important to the success of any relighting program is the use of good lamp bulbs. Thousands of industrial purchasers buy G-E MAZDA lamps because these lamps stay brighter longer . . . provide more light at no additional cost for current. Use the new brighter 1939 G-E MAZDA lamps in your plant. Write General Electric Company, Dept. 166-IA-D, Nela Park, Cleveland, Ohio, for a free copy of the new booklet, "Lighting for Production in the Factory."

With a G-E Light Meter you can measure the light in your plant and find out whether the various departments are getting enough uniform light for safe seeing. It costs only \$11.50.

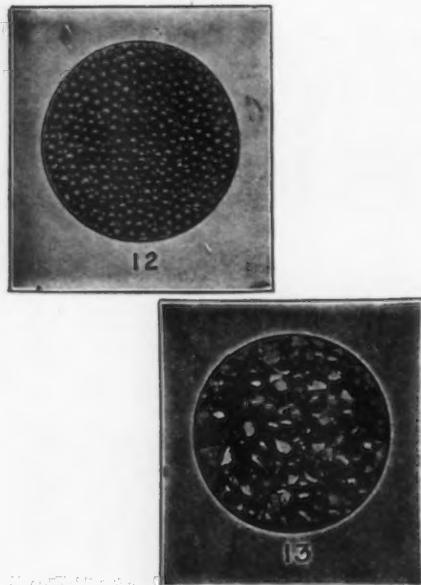
They stay brighter longer



With lighting fixtures too far apart, poor distribution as shown in the top illustration, is the result. For best seeing conditions, the illumination in footcandles throughout the work area should be reasonably uniform. Properly spacing the lighting fixtures, as shown below, results in greater uniformity.



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by its members and its employees." As a justification for his suggested investigation, he referred members to the Congressional Record covering the last two years which he said by itself contains more than sufficient claims and criticism to warrant a thorough investigation.

The inquiry desired by Cox would not only be directed against the board's activities and policies but against employees as well. That would give a Congressional committee "a very considerable field to cover in ascertaining who these employees of the board are, and what their background and experience or prejudices may be, and what general political trends they may be seeking to serve," the Congressman said.

LaFollette Charges Workers Blacklisted

WASHINGTON — The Senate Civil Liberties Committee, in the first of a series of reports on labor policies of employers' associations, charged last week that the National Metal Trades Association had attempted to nullify the operation of the Wagner Act, had threatened expulsion of members for compliance with the act and had maintained a blacklist of active union workers.

The report, written by Chairman LaFollette and the committee's only other member, Senator Thomas, Democrat of Utah, said that the organization "mobilized all its resources" against "orderly collective bargaining procedure" in the NLRB cases involving the Columbian Enameling & Stamping Co., of Terre Haute, Ind., and the Fansteel Metallurgical Co., of North Chicago. Both of these cases were taken to the Supreme Court where the companies were upheld in the Fansteel case and the court handed down its decision outlawing the sit-down strike.

The committee pointed out that its bill is designed to revise the Walsh-Healey Public Contracts Act to prevent firms employing "labor spies" from receiving Government orders and in this connection said that members of the National Metal Trades Association from 1933 to 1936 received \$12,000,000 worth of Government contracts.

Other reports are expected to cover the committee's investigations of the National Association of Manufacturers and the Associated Industries of Cleveland.

Government Steel Orders Total \$147,835

WASHINGTON — Government purchases of iron and steel products, as reported by the Public Contracts Division, Department of Labor, for the week ended April 1, totaled \$147,835.73. Purchases of non-ferrous metals and alloys aggregated \$459,488.87, and contracts covering machinery purchases totaled \$535,491.35. Details follow:

Iron and Steel Products

Keystone Steel & Wire Co., Peoria, Ill., wire fencing	\$12,966.84
Crucible Steel Co. of America, New York City and Harrison, N. J., forgings, alloy steel	26,427.50
Albert & Davidson Pipe Corp., Brooklyn, steel pipe	54,496.42
The Timken Roller Bearing Co., Steel & Tube Division, Canton, Ohio, steel, nickel	18,440.00
The Aluminum Cooking Utensil Co., New Kensington, Pa., kettles, aluminum or steel	12,170.97
Commercial Iron Works, Portland, Ore., radial gates, hoists	10,549.00
Fassler Iron Works, Inc., New York City, fabricated steel	12,785.00

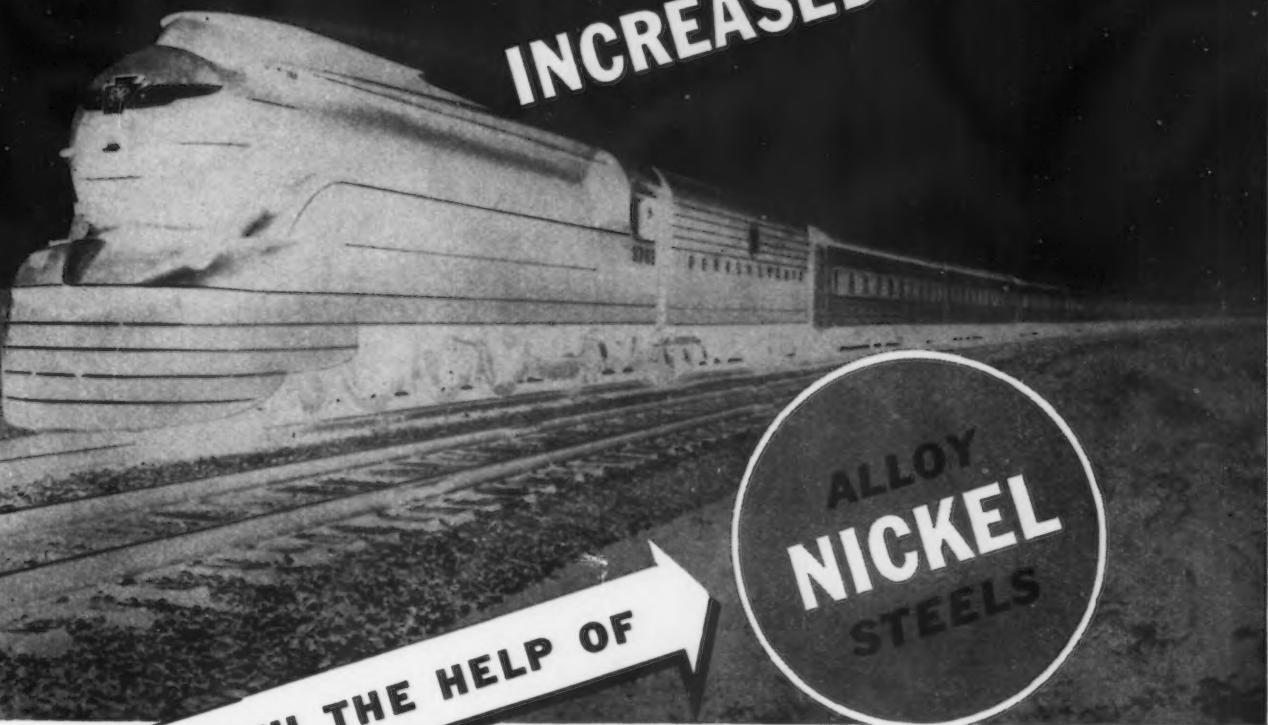
Non-Ferrous Metals and Alloys

Walworth Co., New York City, Greensburg, Pa., and Boston, fittings, pipe and tubing, bronze	\$15,439.48
Chase Brass & Copper Co., Inc., Waterbury, Conn., tubing, copper	12,851.04
The International Nickel Co., Inc., New York City, copper nickel alloy sheet	21,288.53
Revere Copper & Brass, Inc., Detroit, brass, bronze, aluminum	12,353.02
The International Nickel Co., Inc., New York City, Huntington, W. Va., nickel-copper forgings	397,556.80

Machinery

Chicago Pneumatic Tool Co., Philadelphia, air compressors	\$10,737.00
Davey Compressor Co., Kent, Ohio, air compressors	11,890.00
Tractor & Equipment Co., Glasgow, Mont., tractors, parts	49,000.00
The Warner & Swasey Co., Cleveland, turret lathe	14,534.30
Sundstrand Machine Tool Co., Rockford, Ill., milling machines	41,441.00
Sundstrand Machine Tool Co., Rockford, Ill., milling machines	18,642.00
The American Tool Works Co., Cincinnati, engine lathes	15,589.00
The R. K. Leblond Machine Tool Co., Cincinnati, engine lathes	34,755.00
Pratt & Whitney Division, Niles-Bement-Pond Co., Hartford, Conn., vertical shapers	12,088.00
Consolidated Machine Tool Corp., Rochester, N. Y., boring mill	152,800.00
W. E. Shipley Machinery Co., Philadelphia, grinding machine	34,795.00
The Moore Special Tool Co., Inc., Bridgeport, Conn., progressive dies	10,215.00
Northwest Engineering Co., Chicago, power shovel	15,500.00
Harnischfeger Corp., Milwaukee, excavating machine	18,985.00
Pacific Marine Supply Co., Seattle, Wash., pumpers	15,426.25
Salvage Process Corp., New York City, tank cleaning equipment	14,850.00
Warren Steam Pump Co., Inc., New York City and Warren, Mass., centrifugal pumps	40,369.00
E. A. Laboratories, Inc., Brooklyn, electric horns	13,116.00
American Machine & Metals, Inc., New York City and East Moline, Ill., laundry equipment	10,755.80

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WHETHER you're hauling extra fare passengers, or doing precision machining—Nickel can make each ounce, each inch of metal do more work at lower cost per year.

Nickel, alloyed into steels, irons or non-ferrous metals, provides improved mechanical properties. The heightened abilities of Nickel alloyed materials cut rejects during production, lower machining costs, and increase profits by lengthening service life. For specific information about money-saving applications of Nickel in your industry, please address your inquiry to the address below.

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Wheeler Commodities Clause Considered A Drastic Step

WASHINGTON — Despite assurances that the commodity clause proposed in the new Wheeler-Truman bill is not intended to operate in reverse and prohibit manufacturing companies from shipping their products on affiliated or subsidiary railroads and other transportation systems, testimony being given before the Senate Interstate Commerce Committee at public hearings on the measure indicates that some witnesses regard the clause as much more drastic than the present one.

W. H. Day, chairman of the executive committee, National Industrial Traffic League, told the committee last week that the clause is "made more drastic by forbidding the transportation of products in which any subsidiary or affiliated or controlling company has any interest." He said the league is opposed to the change which "obviously goes far beyond any mere recodification or restatement," adding that "there are many circumstances and places where the only transportation service available is furnished by a carrier having some relationship to the manufacturing, mining or producing company and we do not know of any demand for legislation making such transportation unlawful."

Too Drastic—Wheeler

Chairman Wheeler, who told THE IRON AGE last week that it was not his intention that the clause would operate both ways, said at the hearing that he is inclined to think that it may be too drastic and that perhaps it should be revised.

He declared later in the hearing, however, that one difficulty about re-enacting the present clause was the possibility that courts would regard such action as having been taken with knowledge of the Elgin, Joliet & Eastern case, in which the Supreme Court held that the railroad, whose stock was owned by the United States Steel Corp., had not violated the commodities clause by transporting products manufactured by subsidiaries of the corporation.

It was the "guess" of J. V. Norman, counsel for the Property Owners' Committee, an organization of coal producers in West Virginia, that the Supreme Court, as now constituted, might reach a different decision in the E. J. & E. case.

Although there appeared to be considerable confusion in the minds of

some observers as to what Wheeler's stand is with respect to the clause, the Senator confirmed statements made by ICC officials last week that it had been drafted to meet the Supreme Court decision. Several times throughout the hearings he reiterated his statement that the clause would have to be revised although he failed to indicate to what extent he favored modification.

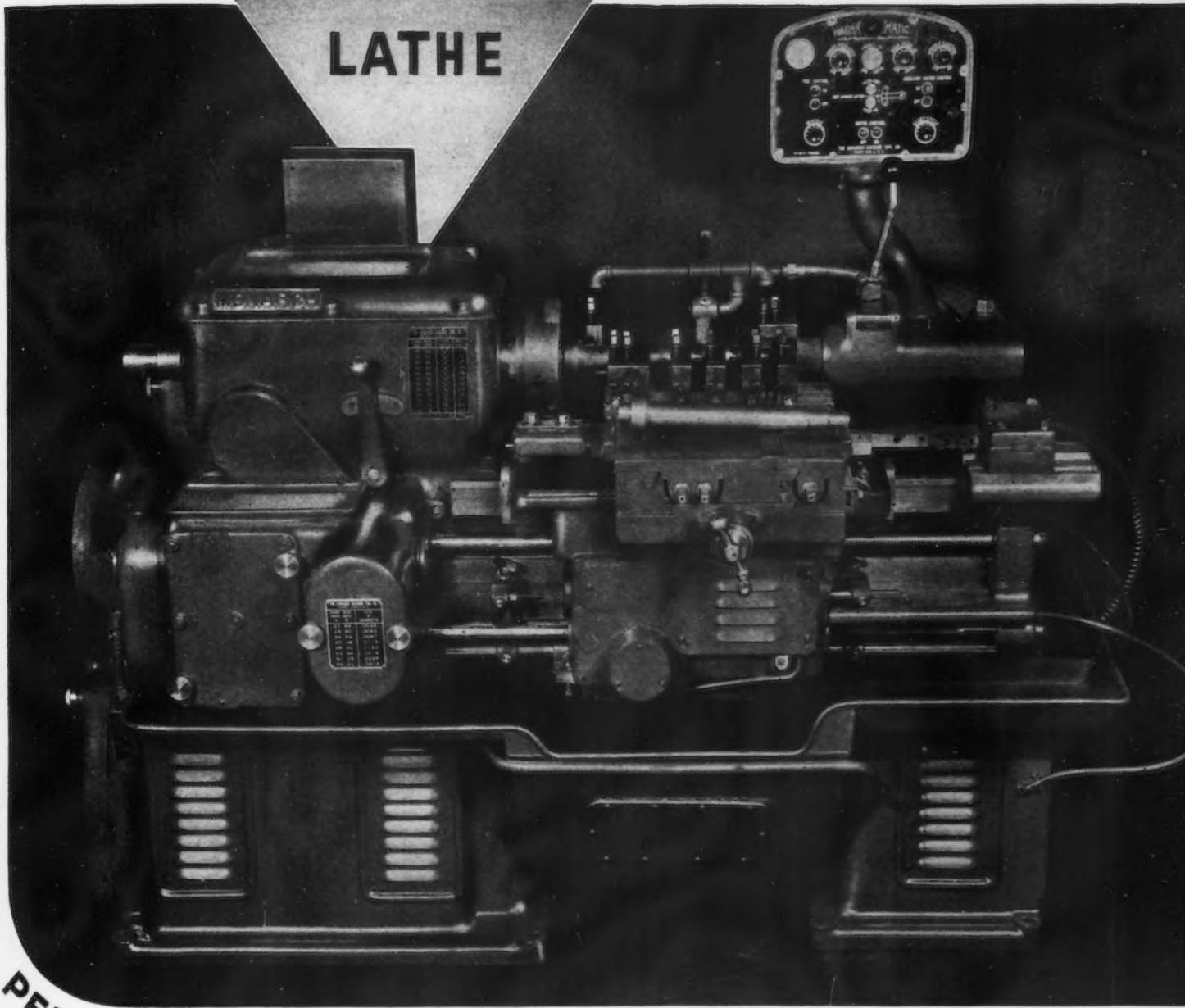
The attitude of Senator Wheeler and other members of the committee having similar views on the question of waterways regulation was expressly reflected during testimony of H. A. Feltus, Minneapolis, representing the Upper Mississippi Water Association, and other waterway interests, together with the City Council of Minneapolis. Mr. Feltus declared that passage of the legislation to regulate water carriers would be equivalent to a declaration to taxpayers that Congress had spent all it can on waterways for navigation and that the waterways can no longer be used in the interest of producers and consumers. Reference to "low cost" water transportation caused Senator Wheeler to remark that the Standard Oil Co. uses the Mississippi River a great deal and to inquire if Mr. Feltus could cite an instance where the Northwestern consumer had benefited "as much as one-tenth of a cent" in the reduction of the price of gasoline.

The Senator proceeded to ask where a consumer had benefited "one-tenth of a cent" per pound in the price of steel by reason of the United States Steel Corp. barge operations. Mr. Feltus replied that the waterways had put Pittsburgh steel into the Southwestern markets in competition with imported steel. Senator Wheeler declared that he was willing to "venture the assertion" that steel companies have not made price concessions based upon transportation savings achieved through the use of the Ohio and Mississippi rivers. The Senator alleged that steel, cement and "all these people" never pass the savings on to the consumer when they use these "subsidized river and barge lines."

"Capture" by American steel manufacturers of Southern markets after the opening of the improved Ohio River was mentioned also by O. S. Barrett, president of the Mississippi River System Carriers' Association. Senator Wheeler asked if that was the result of the waterways or the tariff.

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Scrap Men Plan Survey After Talk With War Board

WASHINGTON—After confering with the planning branch of the Army and Navy Munitions Board, the War Service Committee of the Institute of Scrap Iron and Steel made plans last week to undertake a survey of available stocks and an

analysis of steel mill and foundry scrap requirements.

E. C. Barringer, executive secretary of the institute, explained that the objective is an orderly flow of materials to consumers, with priority for Government requirements and to maintain the permissible production of iron and steel for civilian uses, "all with a minimum of cross hauling."

Because corrosion makes long-term stocking uneconomic and because the domestic reservoir of scrap is large,

Mr. Barringer said that scrap is not included among the strategic and critical materials which would be accumulated by the War Department under bills pending on Capitol Hill. He said, however, that the industry is preparing to cooperate with the Government to assure an adequate supply of scrap for steel mills and foundries in the event of an emergency.

Supplies Found Ample

"Present visible supplies and reserves of scrap are ample to take up any sudden strain occasioned by a possible sharp rise in the rate of steel production in event of an emergency," Mr. Barringer declared. "Meanwhile, an increase in the consumption of steel would automatically expand the production of scrap and augment the present visible supply."

The present market price of scrap was estimated at about one-half the fixed levels during the World War or about two-thirds of the peak of the 1937 market. It is the view of the institute that this is indicative of a lack of fear on the part of consumers. In the manufacture of steel, Mr. Barringer said, scrap is one-half of the raw materials utilized, and each ton of scrap charged into steel furnaces conserves five tons of natural resources, including iron ore, limestone, etc.

Attending the conference with War and Navy Department officials were William J. Wolf, of Wolf & Co., Hamilton, Ohio, chairman of the institute's War Service Committee; Ben G. Kaplan, M. S. Kaplan Co., Chicago, vice-chairman; Joel Claster, Luria Bros. & Co., Inc., Philadelphia; Benjamin Schwartz, Schiavone-Bonomo Corp., New York; W. J. Ross, Hyman-Michaels Co., Chicago; Darwin S. Luntz, the Luntz Iron & Steel Co., Canton, Ohio; Joseph E. Jacobson, president of the institute, Pittsburgh, and Mr. Barringer.



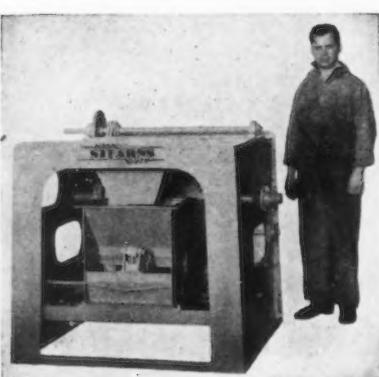
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STEARNS improved, better designed and better built electro-magnetic equipment will definitely help you get economical, smooth, trouble free production.

Use STEARNS magnetic clutches and brakes for efficient transmission control; STEARNS magnetic separators for a purer product and protection of processing machinery.

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Factory To Be Erected On Speculation in Chicago

CHICAGO—The Clearing industrial district, of Chicago, site of many of the city's largest industries, is planning to build a factory on speculation, a development without precedent in the 30-year history of the district. Heretofore factories have been erected only for sale or lease. Now, however, with all available space occupied, officials of the district are proving their confidence in the future, and preparing for an anticipated rise in Mid-west factory construction.

National Steel to Sell \$50,000,000 Bonds

WASHINGTON—The National Steel Corp. registration statement filed with the Securities and Exchange Commission last week provides for a refinancing program and the discharge of a \$5,000,000 obligation. It covers \$50,000,000 of first (collateral) mortgage bonds, due April 1, 1965, and \$15,000,000, due April 1, 1940-1949. Amendments to be made to the registration statement will set forth the interest rates. According to the statement the proceeds from the sale of the securities will be applied as follows:

\$49,350,000 to the redemption at 105 per cent and accrued interest of \$47,000,000 principal amount of the company's 4 per cent series bonds.

\$9,917,000 to the redemption at 105½ per cent and accrued interest of \$9,400,000 principal amount of the Company's 3¾ per cent series bonds.

The balance of the proceeds, together with treasury funds to the extent required, will be advanced to Great Lakes Steel Corp., a subsidiary, and will be used by that company to discharge a \$5,000,000 deferred obligation representing a portion of the cost of additional facilities constructed during the past two years. Accrued interest on the bonds to be redeemed will be paid out of the company's treasury funds, it is stated.

Kuhn, Loeb & Co., Harriman, Ripley & Co., Inc., White, Weld & Co., and Lee Higginson Corp., all of New York, will be the principal underwriters of both the bonds and notes.

A.F.L. Wins Prevailing Wage Clause for Housing

WASHINGTON—The American Federation of Labor last week succeeded in getting approval by a Senate sub-committee of the Appropriations Committee of a "prevailing wage" provision in the Government's insured housing program, as the committee agreed to a \$1,000,000,000 increase in the Federal Housing Administration's insurance limit. Under the amendment the prevailing wage scale would be paid on all projects insured by FHA and costing \$16,000 or more. The Secretary of Labor would be required to determine minimum wage levels. At the previous session of Congress FHA officials protested against a prevailing wage amendment regardless of the cost of projects. After a heated debate in the Senate the amendment was dropped.

Wisconsin Forbids Secondary Picketing

MILWAUKEE—A bill to prohibit "stranger picketing" in Wisconsin has been enacted by the Wisconsin Legislature and made into law by the signature of Governor Julius P. Heil, Milwaukee industrialist, who took office Jan. 2, with campaign pledges to redeem Wisconsin industrial conditions with legislation giving employers a fair opportunity in labor disputes.

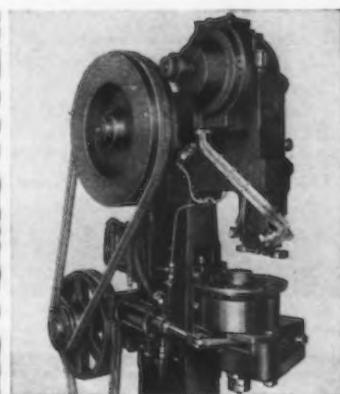
The law declares it unlawful "for anyone to picket, or induce others to picket, the establishment of anyone engaged in business or to interfere with his business, or interfere with any person or persons desiring to transact business with him, when no labor dispute exists."

G. L. Williston has opened an office at 2-259 General Motors Building, Detroit, to sell new, used and rebuilt tool room, production and furnace equipment. Mr. Williston has been in business in Detroit for the past 14 years.

the RIVITOR

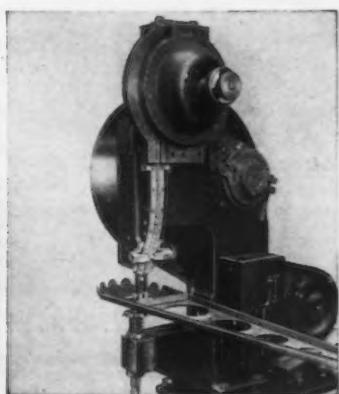
already serves these industries . . .

AUTOMOTIVE . . .



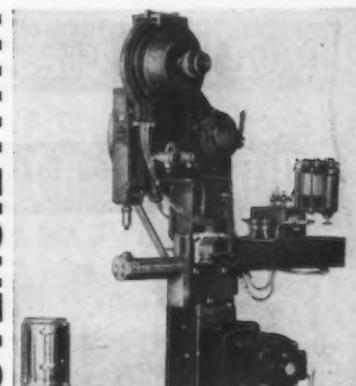
The Rivitor is shown here setting two solid rivets at a time to attach cushion springs to driven clutch plate assemblies.

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This is the standard "BR" Bench Type Rivitor tool for setting $\frac{1}{8}$ " diameter $\times \frac{1}{4}$ " long duralumin rivets in airplane sections.

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The Rivitor is shown here setting aluminum rivets to attach handle brackets to bodies of percolators.

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This Rivitor sets two rivets at the same time to attach handle brackets to paint pails.

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This will give you more information
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German Steel Mills Set Record in 1938

WASHINGTON — Production and sales of the German iron and steel industry established an all-time record in 1938, according to a report from the American consulate at Cologne made public by the Department of Commerce. It is pointed out that the industry has established new all-time high records for production for each year from 1936 to 1938. Production in 1936 exceeded for the first time the record established in 1929, the most prosperous year under the former government.

Pig iron output totaled 18,512,500 metric tons in 1938, an increase of 16 per cent compared with 1937. Steel production was recorded at 23,241,900 metric tons, an increase of 17 per cent. Products of rolling mills totaled 16,848,300, an increase of 9.2 per cent. The consulate reported that a large portion of the increase in the output of steel is accounted for by producing units located in former Austria.

Exports of rolling mill products from Germany have decreased substantially despite the increased production of the industry. Foreign shipments of these products in 1938 amounted to 2,017,500 metric tons, or 12 per cent of the total production compared with 17.8 per cent in 1937.

Experts in Germany agree that the output of the country's deposits of iron ore will probably never be sufficient to supply the requirements of the local iron and steel industry. It has been estimated that the iron ore deposits of Germany are capable of being exploited to provide for only 60 per cent of the industry's requirements and that this percentage could be attained only by the complete disregard of economy in mining and smelting, according to the report.

U. S. Spends \$14,000,000,000 To Lift Income \$9,000,000,000

ANALYZING five years of deficit spending or pump-priming from 1934 through 1938, the statistical division of the National Industrial Conference Board finds that for every borrowed dollar spent by the Federal Government, at most only 64c. was received by the people of the United States in the form of yearly real income of goods and services. The Government increased the national debt by \$14 billion and lifted the national income by only \$9 billion in 1934 through 1938.

Power Engineers Have Twin Goals, L. W. Wallace Finds

CHICAGO—Power engineers today have two primary thoughts in mind, automatic power plant control and the selection of long-life equipment, declared L. W. Wallace, director, division of engineering and research, Crane Co., Chicago, in the opening paper of the second annual Midwest Power Conference held in Chicago last week.

To secure the latter, Mr. Wallace said, much research is necessary, including well-equipped laboratories for complete physical and chemical analyses of ferrous and non-ferrous metals. Operating conditions today include such factors as high pressure, high temperatures, corrosion and erosion, wear of metals, and the relative coefficient of expansion and contraction of metals. The high pressure-high temperature combination alone causes many metallurgical problems, Mr. Wallace continued.

Creep and Design Stresses

Of particular interest in the metals and welded construction section, was J. C. Hodge's paper on "High Pressure-High Temperature Metallurgy," about which more will be said next week in *THE IRON AGE*. Mr. Hodge is chief metallurgist, the Babcock & Wilcox Co., Barberton, Ohio.

In the same section, J. J. Kanter, research metallurgist of the Crane Co., discussed "The Influence of Creep Studies on Allowable Design Stresses." Mr. Kanter, an authority on creep in steel, told of the industrial value of creep studies, the character of creep, creep stress, creep testing methods and apparatus, the reliability source and utilization of creep data, and allowable working stresses based on creep data.

The rising star of diesel power was indicated in C. G. A. Rosen's talk on "Diesel Tractor Power" as he read figures showing that diesel horsepower sold has increased from 100,000 in 1932 to 2,075,000 in 1937.

Diesel Spurs Improvement

Mr. Rosen, who is assistant chief engineer in charge of diesel research for the Caterpillar Tractor Co., Peoria, Ill., said that in the field of metallurgy the diesel engined tractor has stimulated vast improvement in cylinders, piston rings, bearings, crankshafts and castings. The untiring effort to combat dust abrasion and wear incident to heavy duty operation has resulted in superior cylinder materials and piston rings, has instituted

Cut Production Costs with



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For temperatures up to
300° F.



85% Magnesia
For High and Medium
Pressure.



Combination Hi-Temp—
85% Magnesia.

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Modern industrial plants are saving thousands of fuel dollars each year through the correct application of CAREY Heat Insulations... a complete line of high efficiency insulating materials of Asbestos and Magnesia for every known service condition—for temperatures ranging from

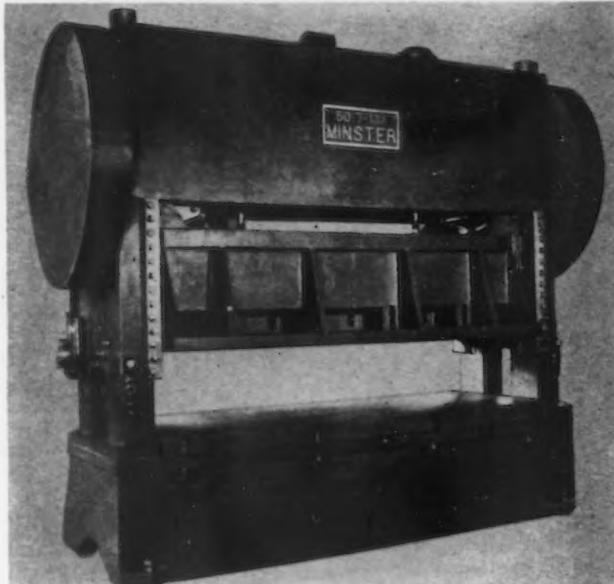
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represents a scientific distribution of weight, using low stress figures and following through with a pleasing appearance. The long bearing guides on the slide insure a uniform pressure over the entire surface of the bed.

There is a Minster for your work

THE MINSTER MACHINE CO., Minster, Ohio

new methods of hardening and surface treatment and finish characteristics.

Close control of proper temperature gradients in heat saturated castings has materially broadened the knowledge of foundry practice, Mr. Rosen pointed out.

The principal assistant superintendent of motive power and machinery of the Chicago & Northwestern Railway, H. P. Allstrand, in his paper on "Railway Motive Power" said that though the electric, diesel-

electric, and steam turbine electric locomotives are all important and are destined for increasing use, the continued development of the steam locomotive assures its use for many more years.

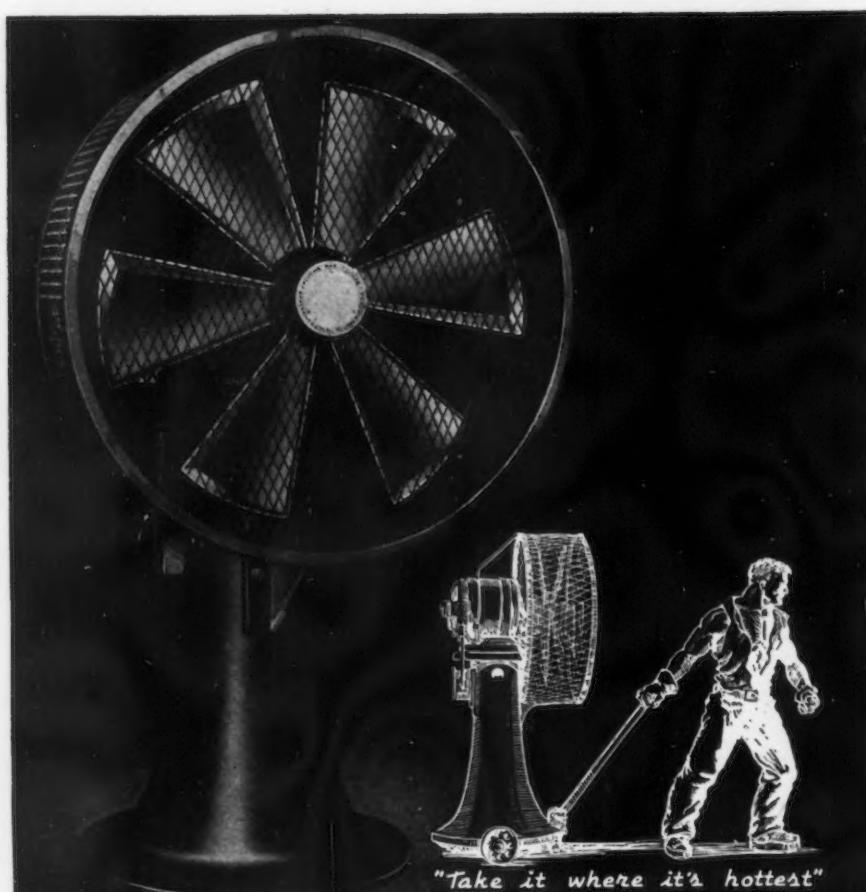
Permits Higher Pressures

The locomotive of today could not have been developed 10 years ago, Mr. Rosen said. Alloy steels in boilers have permitted increasing steam pressures, without corresponding increases in weight. Alloys have also allowed re-

ductions in weight of reciprocating parts, main and side rods, axles, crank pins, valve gear, etc.

On Jan. 1, 1939, 439 diesel switchers were in service ranging from 120 hp. in industrial service to 2000 hp. in heavy switch and transfer service. The use of this type equipment, is justified, according to Mr. Rosen, when continuous operation of at least 16 hr. daily is required. In main line passenger service a diesel locomotive must be run from 800 to 1000 miles daily. They have shown a favorable operating cost compared with steam, and have the added advantage of continued high speed, smoother starting and acceleration and deceleration at stops.

More than 20 papers pertaining to power production, transmission or consumption were presented at this conference which is sponsored each year by Armour Institute of Technology, Chicago, with the cooperation of seven middle-western universities and colleges, and the local chapters of six engineering societies. About 450 registered guests attended the meetings this year.



Perkins Man Coolers create refreshing re-circulation of air without chilling drafts.

Perkins Man Coolers help to maintain production schedules in the hottest places.

Perkins Man Coolers decrease labor turnover and help to make contented workers.

Perkins Man Coolers are made in Oscillating and Stationary types, both portable.

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Conference on Economics Planned by Stevens Institute

THE interrelations of business and government will constitute the general theme of the ninth annual Economics Conference of Engineers at the Stevens Engineering Camp, Johnsonburg, N. J., June 24 to July 3, according to an announcement of the program of the conference made by Dr. Harvey N. Davis, president of Stevens Institute of Technology. In issuing the call for the 1939 conference, the college is joined by the management division of the American Society of Mechanical Engineers and the New York section of the American Institute of Mining and Metallurgical Engineers.

The conference group will be addressed at their first session, on Saturday evening, June 24, by Dr. Leverett S. Lyon, executive vice-president of the Brookings Institution of Washington, on "Business and Government: An Orientation View." Speakers at evening sessions during the succeeding week will include Virgil Jordan, president of the National Industrial Conference Board; Carroll Miller, Interstate Commerce Commissioner; R. V. Fletcher, vice-president and general counsel of the Association of American Railroads; and Professor Walter E. Spahr of New York University.

T.C.I. Pushes Output of Prefabricated Building Sections

INSTALLATION of machinery required for quantity production of cold formed steel sections to be used in prefabricated building units for houses and other structures has been started in the Tennessee Coal, Iron & Railroad Co.'s fabricating shop at the Fairfield works, Robert Gregg, president, announced.

Equipment to be installed includes forming, welding, assembling, painting and drying machinery, Mr. Gregg said. Installation will require approximately five months. In addition to new equipment purchased, much of the machinery now in use at the fabricating shop will be modernized during the program.

Several months ago, the Tennessee company entered the prefabricated metal structures field, producing standard panel sections with facilities then available in the fabricating shop. Fourteen units of farm dwellings and outbuildings were sold to the Farm Security Administration for erection on rural sites in Alabama, Georgia, South Carolina and Florida.

Recently, however, an accumulation of orders, foreign as well as domestic, made it necessary for the company to quicken production.

"This company does not expect to go into the erection or retail sale of the structures," said Mr. Gregg. "It is our intention to supply the prefabricated material to contractors, builders, or large-volume purchasers."

Detroit Tool Engineers Install Officers April 13

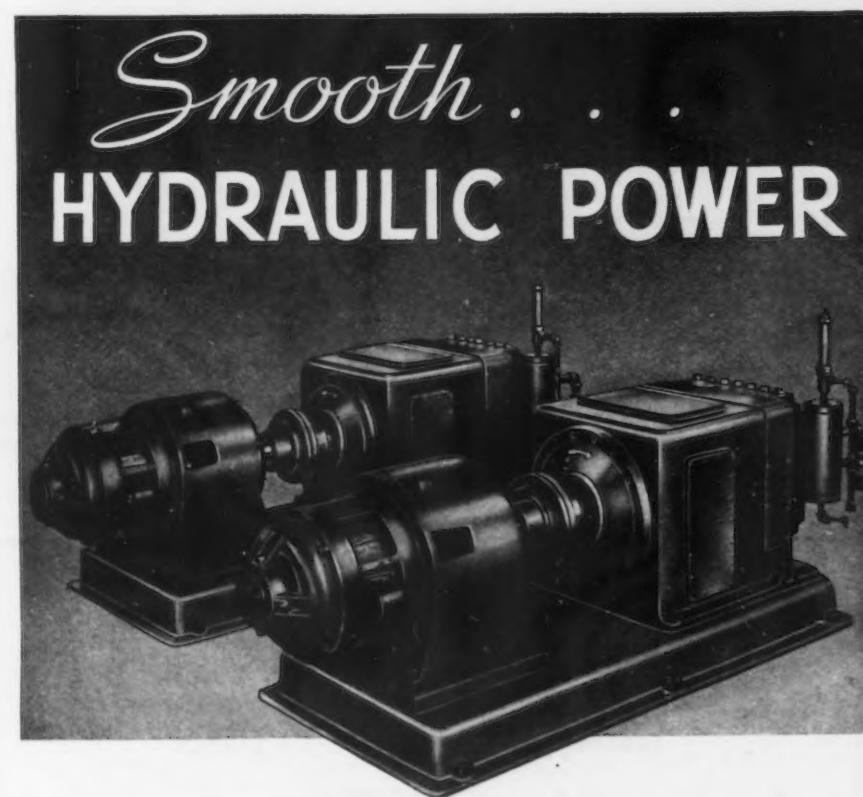
NEW officers of the Detroit Chapter of the American Society of Tool Engineers were to be installed at a meeting Thursday, April 13. The ceremony was to follow a technical session addressed by Don Flater, factory manager, Chrysler Corp. His subject will be "Tool Engineers Must Qualify for Greater Responsibility."

Bethlehem Steel Co.'s picture "Building of the Golden Gate Bridge" will be shown at the meeting which will be started with dinner at 6:30 p.m. at Hotel Fort Shelby.

Officers to be inducted include C. Thiede, chief tool engineer of the Chrysler Jefferson plant, chairman; Ken Kuhn, sales engineer, Morris

Counter-Bore Co., vice-chairman; Lee Diamond, sales engineer, Consolidated Tool Co., secretary; L. W. Howe, sales engineer, Lincoln Park Tool & Gage Co., treasurer. Also at the meeting new committee chairmen who are taking over duties for 1939-1940 will be

introduced. They are C. L. Hause, Gorham Tool Co., Meetings Committee; F. Hebert, Racine Tool & Machine Co., Industrial Relations; A. Ketelsen, Fisher Body Co., Membership; G. Whitehouse, Snyder Tool Co., Reception and Entertainment; E. Elliott, Pontiac Motor Co., Publicity and Editorial; J. P. DeMontigny, Chrysler Motor Corp., Standards; and C. Mooney, Pioneer Engineering Co., Constitution and By-Laws.



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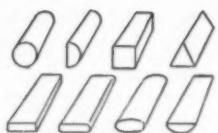
Stediflo Hydraulic Pressure Pumps utilize a greatly improved design that results in more efficient operation and more compact installations. A circular arrangement of plungers, actuated by a swash plate, insures high efficiency and greatly reduced pulsation.

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really fits the job—in shape,
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Reduce your tool and die costs with
HY-TEN "M" TEMPER, .70 CARBON
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Extreme toughness at high degrees of
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RALPH B. KRAFT has been appointed manager of the roll sales department of the Lewis Foundry & Machine division of Blaw-Knox Co., Pittsburgh. Mr. Kraft has been with the division in other capacities for some time, and has had considerable experience with the steel industry as a manufacturers' agent.

* * *

L. G. HAGEN, assistant to the manager of Western railroad sales, Carnegie-Illinois Steel Corp., Chicago, retired March 17, after 43 years of service. Mr. Hagen first became associated with the steel industry in June, 1896, with the American Tin Plate Co., Elwood, Ind., transferring to the Chicago office of the Illinois Steel Co. in October, 1900. D. V. CARLSON, who became identified with the Chicago railroad sales office as a clerk in 1926, will succeed Mr. Hagen. Mr. Carlson's introduction to the steel industry came in 1917 when he started at Gary works of the Illinois Steel Co.

* * *

F. H. CASH has been appointed general superintendent of the Minnesota ore mines of Republic Steel Corp., with headquarters at Hibbing, Minn., and W. M. Webb has been appointed general superintendent of the Michigan mines with headquarters in Bessemer, Mich. The division of Republic's northern ore mines into two districts follows the death of JOHN E. NELSON, who was for many years manager of that district. Both Mr. Cash and Mr. Webb are veterans in the Northern ore fields.

Mr. Cash was superintendent of the Susquehanna Alexandria mines and has been with Republic and its predecessor company for the past 30 years, prior to which time he was with the Maintenance of Way Department of the Frisco line.

Mr. Webb has been with Republic 29 years. He started in as mine captain, was promoted to safety inspector, then superintendent, having been superintendent of Penokee and Ironton mines prior to his recent appointment. Before his association with Republic, Mr. Webb was with the Pittsburgh Iron Ore Co.

* * *

ALEXANDER C. BROWN, vice-president of Cleveland-Cliffs Iron Co., Cleveland, and W. C. DRESSLER, vessel manager of Oglebay, Norton & Co., Cleveland, have been added to the board of directors of the Lake Carriers Association. OLIVER T. BURNHAM has been elected secretary, suc-

PERSONALS . . .

ceeding GEORGE A. MARR, who continues as treasurer. Mr. Burnham has been serving as assistant secretary.

* * *

WILLARD T. WALKER, president of the Walker Mfg. Co., Racine, Wis., has been elected chairman of the board. He is succeeded as president by JAMES S. ALLAN, of Racine, an executive of the firm for many years.



RALPH B. KRAFT

JOHN H. BRUINSMA, of Grand Rapids, Mich., has been elected president of the Panyard Piston Ring Co., Muskegon. He succeeds DONALD M. BIGGE, who now occupies a position of vice-president after serving as head of the business for 10 years. JOHN D. BLACK, formerly with the Sealed Power Corp., Muskegon, has been elected secretary and treasurer of the Panyard company, succeeding C. C. BIGGE, of Manistee.

* * *

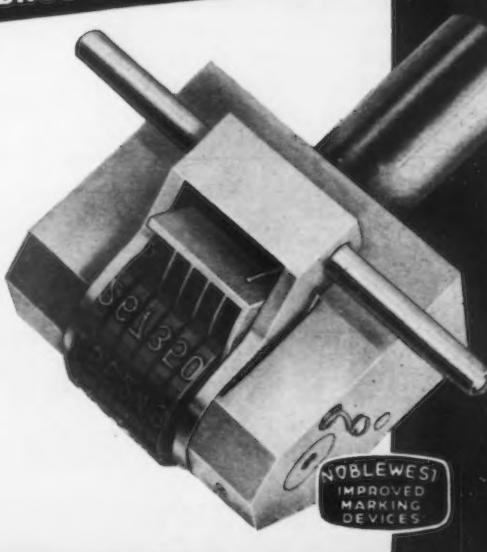
JOHN C. CHAFFE, of the Philadelphia district sales office, Republic Steel Corp., has been appointed assistant district sales manager of the Philadelphia territory.

Mr. Chaffe joined Republic in 1931 at Philadelphia, where he specialized in tubular products. He was graduated from Lehigh University in 1914. The same year he joined the A. M. Byers Co., Pittsburgh, as a sales apprentice and was later assigned to the company's New York district office on promotional work. Five years later he

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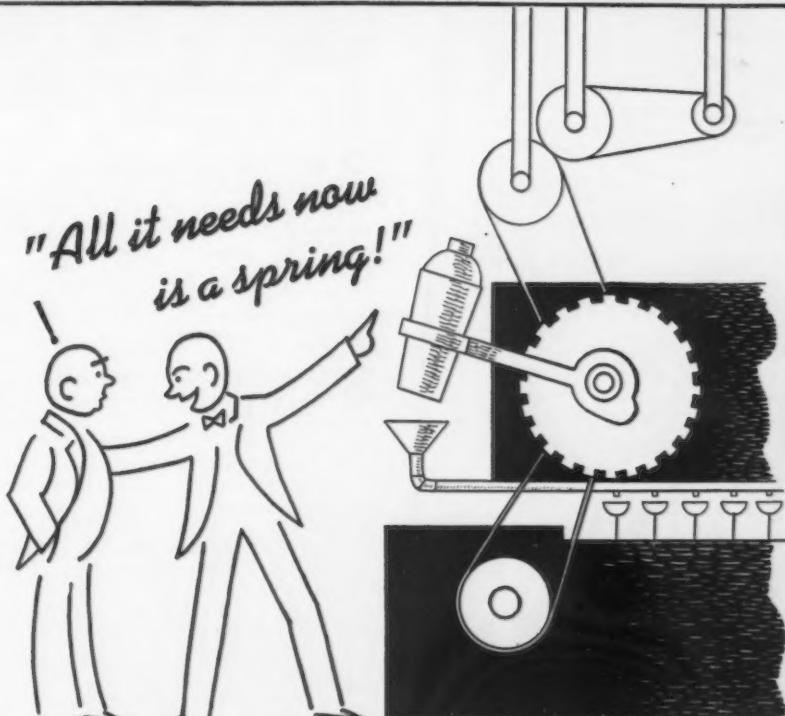
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"All it needs now
is a spring!"



Better see DUNBAR
BROS. COMPANY
DIVISION OF ASSOCIATED SPRING CORPORATION
BRISTOL, CONNECTICUT

"They've been making quality springs for nearly one hundred years"

was made district sales manager in the Byers company Philadelphia office. In 1930 he was named vice-president of the Wrought Iron Co. of America, Lebanon, Pa., where he remained until he became associated with Republic.

* * *

E. H. DIX, JR., chief metallurgist of the Aluminum Co. of America, has been selected to present the 1940 Institute of Metals lecture of the American Institute of Mining and Metal-

urgical Engineers at the annual meeting of the A.I.M.E. in February, 1940.

* * *

L. BREWSTER JACKSON, who has been associated with Wickwire Brothers, Inc., Cortland, N. Y., for 14 years, has been appointed sales manager, succeeding GEORGE H. KENNEDY. He has been covering the Southern and New England territories from the company's Philadelphia office. He has had a long experience in the wire business.

previously having been associated with his father's firm, Jackson & Cook, Philadelphia.

* * *

WYMAN HOWELLS, formerly connected with the Reading Iron Co., has been added to the sales staff of the Houston office of the Allegheny Ludlum Steel Corp., Pittsburgh. He will specialize in the sale of the company's lap weld line pipe.

* * *

RALPH HERING has been made district manager of the Dayton office of Superior Steel Corp., Pittsburgh.

* * *

DAVID P. GRAHAM, manager of the gas scrubber division of the Peabody Engineering Corp., New York, sailed March 30 on a European business trip. He will spend several weeks in England, Holland and France, returning in May.

* * *

RAY APPLEGATE, widely known in the welding field, has been named Detroit agent by Thompson-Gibb Electric Welding Co. with offices at 4-120 General Motors Building. Mr. Applegate has been closely identified with electric welding since 1920. During the last four years he was with the P. R. Mallory Co. in Detroit and for the four years preceding was with Hudson Motor Car Co. as welding engineer. Previous to that he was welding supervisor for the Ford Motor Co. at the River Rouge plant.

* * *

WALLACE G. SMITH, formerly with the Baldwin Locomotive Works and the Cramp Brass & Iron Foundries Co., has become associated as sales representative with the Birdsboro Steel Foundry & Machine Co., Birdsboro, Pa.

* * *

VICTOR BROOK has been appointed representative in the Rochester, Buffalo and Jamestown areas by the Hall Planetary Co., Philadelphia. He will make his headquarters at 433 Rockingham Street, Rochester.

* * *

H. B. SPACKMAN, vice-president in charge of sales of Lyon Metal Products, Inc., Aurora, Ill., has been made a director. He has been with the company for the past two years, having previously been with the United States Gypsum Co.

* * *

PROF. HARRY D. CHURCHILL, of Case School of Applied Science, Cleveland, has been elected chairman of the Cleveland chapter of the American Society for Metals. Other

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Typical Parts



1 Eliminates Straightening. Parts made from STRESSPROOF No. 2 do not require straightening after machining because of the unusual non-warping qualities of the steel. The elimination of straightening after keyseating, splining, broaching, and similar operations by the use of STRESSPROOF No. 2 has been known to reduce production costs as much as 15% or more.

2 Increases Machining Rates. STRESSPROOF No. 2 with a Minimum Yield Point of 100,000 lbs. per sq. in. machines faster than any other bar of equivalent strength and about 80% of Bessemer SAE 1112. This free machinability plus a comparatively low material cost may well enable you to make substantial savings on many parts.

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Bars—Shafting—Furnace Treated Bars
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officers elected are: LOUIS W. KEMPF, Aluminum Co. of America, vice-chairman; L. F. HERRON, James H. Herron Co., treasurer, and GEORGE J. HALES, Cleveland Electric Illuminating Co., secretary.

* * *

G. O. ROWLAND, for the past year manager of distributor sales for the Osborn Mfg. Co., Cleveland, has been appointed advertising and sales promotion manager of the company's brush division.

* * *

CARL LANDGREBE, vice-president of the Tennessee Coal, Iron and Railroad Co., Birmingham, has been appointed a member of the new Alabama State Board of Agriculture and Industries, created by the 1939 Legislature.

This Week on the Assembly Line

(CONCLUDED FROM PAGE 62)

acres, or 1,000,000 sq. ft. of blueprints are made before the final OK goes on the design of a car. Twenty-seven test drivers total more than 1,000,000 miles each year in their work.

Automobile Men Elected to Office

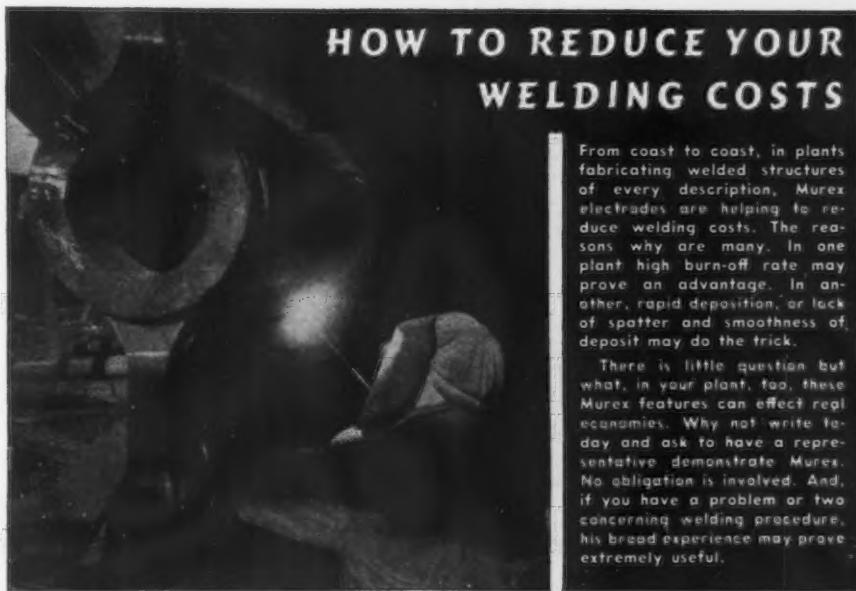
Michigan voters in the election just passed named prominent automotive men to office. Forest H. Akers, vice-president and director of sales of the Dodge division of Chrysler Corp., was elected to the Michigan State Board of Agriculture. Born on a farm near Williamston, Mich., Akers attended Michigan State College, the affairs of which are supervised by the board to which he has just been elected. Also the election of Harry G. Kipke, former University of Michigan football coach, as a regent of the university, carries an automotive note. Kipke now is a manufacturer's representative selling to the automotive trade. During the pre-election days, Harry H. Bennett, personnel director of the Ford Motor Co. and a friend of Kipke, was drawn into public controversy over the nomination, which Bennett helped Kipke to obtain.

"Flocking" a New Term

"Flocking" is one of the latest industrial terms added to the glossary by the automobile industry. It is hard to determine just which company first invented the term or initiated prac-

tice, but "flocking" was first announced by Packard months ago. Luggage compartments (built-in trunks) of the Packard 120 and Six, the Graham and other cars, are being given an interior finish by a novel method. The trunks are given the usual coat of preservative and sound deadening material, then the entire interior is sprayed with a coat of varnish type adhesive. When this has become slightly tacky, flock, which consists of rayon threads chopped in one-sixteenth inch lengths, is blown into it with a spray gun oper-

ated by compressed air. When dry, the coating has the appearance of suede. Neutral colors are generally used to harmonize with the finish of the car. The usual method for finishing a luggage compartment has been to apply panels of jute to the surfaces with various types of adhesive. It has been difficult to fix these jute panels firm enough to last. Flocking also is being used inside glove compartments in some cars. It is a type of metal finishing that should have interest for manufacturers of many other products.



HOW TO REDUCE YOUR WELDING COSTS

From coast to coast, in plants fabricating welded structures of every description, Murex electrodes are helping to reduce welding costs. The reasons why are many. In one plant high burn-off rate may prove an advantage. In another, rapid deposition, or lack of spatter and smoothness of deposit may do the trick.

There is little question but what, in your plant, too, these Murex features can effect real economies. Why not write today and ask to have a representative demonstrate Murex. No obligation is involved. And, if you have a problem or two concerning welding procedure, his broad experience may prove extremely useful.

We've a pocket-size pamphlet giving properties of all electrodes in the Murex line. Send for your copy.



1 In marine work, vertical and overhead welding goes easily and quickly with Murex Vortex (reverse polarity) or Genex (straight polarity). Photo courtesy Ira S. Bushey & Sons Co., Inc., Brooklyn, N. Y.



2 Only 2700 lbs. of Murex welded this 40,000 lbs. jacketed still. Photo courtesy John Nooter Boiler Works Co., St. Louis, Mo.



3 High speed deposition saves time and money on the Lorain 79 Shovel. Photo courtesy The Thew Shovel Company, Lorain, Ohio.



4 Free-flowing Murex downhand electrodes speeded welding on this 96,200 lb. pot chock, 33 ft. 7 in. in diameter, believed to be world's largest. Photo courtesy Lukenweld, Inc., Coatesville, Pa.



METAL & THERMIT CORPORATION
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So. San Francisco • Toronto

Ultra-Opaque Porcelain Enamels

(CONCLUDED FROM PAGE 30)

passes through a 200-mesh sieve. In the enameling plant it is necessary only to add water to it in the mill and then grind to a dry residue of about one gram (per 100-gm. sample of milled enamel) on a 325-mesh sieve. There is no increase in total milling

time, but it is claimed that a cleaner, more uniform enamel is produced, with more accurate control over distribution of particle sizes and ultimate opacity.

Manufacturing specifications on ultrapaque call for a reflectance of 74 (plus or minus one half of 1 per cent) at an application weight of 36 to 37 gm., dry weight, per sq. ft. So opaque is this new material that a 30-gm. application is said to be equivalent to 55 gm. of the average super-opaque

enamel milled with 2 per cent opacifier. Or two 20-gm. coats will give the equivalent of a total application weight of about 65 gm. of the average superopaque enamel developing around 75 per cent total reflectance.

Ferro's Ultralpaque enamel powder is charged into the mill with approximately the usual amounts of water. In most cases nothing else is needed, although in certain special circumstances opacifier or special set-up agents may be used. Actual time of milling may be slightly longer or slightly shorter, depending on the size of the mill and other local conditions. In any case, the present milling capacity of any plant will quite likely be adequate, for not only will there be no appreciable increase in milling time but less enamel will be required.

Spraying is done in the usual manner, except that a special spray head is recommended for the spray gun—a head of the type often used in applying lacquers. The standard type of spray gun sometimes can be used, if the rate of enamel feed is reduced and properly adjusted to prevent "dusting." Convertible spray heads and needles can be secured for either DeVilbiss or Binks type guns.

Needle Valves Sprayed With Zinc

(CONCLUDED FROM PAGE 47)

were cast of so-called semi-steel while the bearing surfaces of the moving elements of the valve were made up of manganese bronze bushings, bars, and rings assembled on the castings. The entire inside surface of the body of the valve casting, 7 ft. in diameter by 7 ft. long, was sprayed with 4 oz. per sq. ft. of zinc to give a coating of approximately 0.006 in. thick. The areas to be sprayed were first heavily blasted with a 16-mesh silica sand to thoroughly clean and to roughen the surface sufficiently to permit of a strong bond between the zinc and the steel. Care was therefore taken to select a variety of sand that was hard and which also had angular grains with sharp cutting-edges to insure obtaining a surface of maximum roughness for receipt of the metal. Sandblasting was followed immediately by spraying.

A standard type of gun handling $\frac{1}{8}$ in. diameter zinc wire was used. The body castings were sprayed with about 70 lb. of zinc over an area of

Combining Stamping and Welding

lowers die cost and makes it possible to gain benefit of rolled steel strength for small quantity purchases.

The channel of this inclinator frame is pressed steel 3' deep and $\frac{1}{8}$ " thick. The lugs and bosses are welded in place.

Parish engineers consider all phases of the problem; appearance, strength, improved design, and production methods leading to minimum costs.

PARISH PRESSED STEEL CO.
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PACIFIC COAST REPRESENTATIVE
F. Somers Peterson Co., 57 California St.
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PARISH
Specialists in
STAMPINGS
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275 sq. ft. The elapsed spraying time was $3\frac{1}{2}$ to 4 hr. The larger 66 in. valve bodies whose inside area was 415 sq. ft. required 105 lb. of zinc and $5\frac{1}{2}$ to 6 hr. to spray. The sandblasting and spraying was scheduled so that not more than 3 hr. elapsed between the two operations. This was a safeguard to keep the prepared surface from becoming oxidized or rusted. Contamination from moisture, oil, or other foreign substances was easily prevented by removing possible sources.

The inner structure of the complete valve is made up of several smaller castings which are finally assembled within the body casting. These parts include the needle body, the body extension, the needle tip and body tip (shown in the accompanying photo, sprayed with zinc), and the diaphragm tube. The surfaces of these castings were prepared and sprayed with zinc according to the specifications and procedures used for the valve bodies.

Many articles other than products of the foundry are being protected with sprayed zinc coatings. In the power and utility field such structures as natural gas holders and tanks, electrical transmission towers, switch and meter cabinets, and pipe lines have been spray-galvanized with 3 to 5 oz. coatings to resist the corrosion of ocean spray, and wet, salt-laden atmospheres. Metal spraying also has proved useful for the re-galvanizing of parts where the continuity of the zinc coating has been destroyed by a machining operation, by mechanical abrasion, or by burning as a result of flame cutting or welding.

Krupps Acquires Control Of the Skoda Works

PRACTICALLY the entire share capital of the Skoda works has now been acquired by Krupps, Essen. This acquisition includes the stock transferred last fall from the French Creuzot interests to a nominee company in Czechoslovakia. In addition, other blocks of shares held in Switzerland and elsewhere have also been sold during the past few weeks. The owners took the view that, owing to the German exchange control, the possibility of obtaining dividends was remote. The Skoda factories employ 50,000 men.

In addition, Germany has taken over the Czech arms factories at Brno, 25 gun and cannon factories, and nine factories employed in constructing tanks and armored vehicles.

Michigan Foundrymen To Meet April 14-15

THE Detroit chapter of the American Foundrymen's Association, in cooperation with Michigan State College, will hold its 8th annual two-day regional foundry conference on April 14 and 15 at East Lansing, Mich. Factors affecting the castability of ferrous and non-ferrous metals as related to physical and mechanical properties, will be discussed.

Among those scheduled to speak are N. A. Ziegler, Crane & Co., Chicago, Fred A. Melmoth, Detroit Steel Casting Co., Detroit, Fred G. Sefing, International Nickel Co., Inc., New York, and A. C. Wheat, Aluminum Co. of America. F. J. Walls, International Nickel Co., Inc., New York, will serve as chairman.

Missouri Valley Electric Co. of Kansas City, Mo., has been appointed wholesale distributor of Allen-Bradley motor control equipment for Kansas and western Missouri.

An illustration of a fisherman in a boat, wearing a hat and coat, pulling a large fish out of the water with a fishing rod. A speech bubble above him contains the text "ONE ALWAYS STANDS OUT!"

GARLOCK
234

IN the records of rod and reel, there's one fellow who always catches 'em more often . . . one angler stands out from the rest. "Fisherman's luck," some say . . . but you know there's a lot more to it than that. It's the same with packings. *It's not just by chance* that GARLOCK 234 Rotopac Coil Packing stands out. Quality is *built into* this packing at the Garlock factories, so that it will give superior performance and last longer. Use GARLOCK on your centrifugal or rotary pumps . . . against hot or cold water, caustic solutions and weak acids. You'll like it!

THE GARLOCK PACKING COMPANY, PALMYRA, N. Y.
In Canada: The Garlock Packing Company of Canada Ltd., Montreal, Que.

A close-up photograph of a roll of dark, ribbed Garlock 234 Rotopac Coil Packing material.

THE NEWS IN BRIEF . . .

Ingot output in March at a slightly higher level than in February.—Page 53.

Though assemblies of cars increased slightly last week, automobile companies are watching sales closely. Plans being made to produce Crosley cars.—Page 60.

Odds are against Wagner Act revision if Congress does not stay in session beyond June 30.—Page 64.

Senator LaFollette charges National Metal Trades Association has employees' blacklist.—Page 66.

Government steel orders for the latest reported week total \$147,835.—Page 66.

Commodities clause in new Wheeler-Truman bill regarded by some witnesses as more drastic than present provision.—Page 68.

Scrap Institute's war service committee begins survey of supplies after talks with Army and Navy Munitions Board planning branch.—Page 70.

Factory to be built "on speculation" in Chicago's Clearing industrial district.—Page 70.

National Steel Corp. will sell bonds to redeem present outstanding obligations.—Page 71.

AFL wins Senate sub-committee's approval of prevailing wage clause in FHA projects costing \$16,000 or more.—Page 71.

New Wisconsin law forbids "secondary" picketing in Governor Heil's program to help industry.—Page 71.

German steel plants set all-time high in 1938 for production and sales, but exports decline—Page 72.

New Deal spends 14 billions in five years for pump-priming, but U. S. income rises only 9 billions.—Page 72.

Power engineers have two primary goals, L. W. Wallace, Crane Co. research director, tells Midwest Power Conference.—Page 73.

Conference on economics is planned for June 24 to July 3, by Stevens

Institute of Technology.—Page 74.

Tennessee Coal, Iron & Railroad Co. installs machinery for quantity production of prefabricated building unit sections.—Page 75.

Detroit chapter of American Society of Tool Engineers to instal officers April 13.—Page 75.

Krupps have acquired control of the Skoda works.—Page 81.

Michigan Foundrymen to meet April 14-15.—Page 81.

American Foundrymen's Association, Detroit chapter, will hold conference April 14-15 at East Lansing, Mich.—Page 81.

Dues check-off in U. S. Steel plants discussed by SWOC.—Page 84.

Republic Steel Corp. announces plan to again give vacations with pay to employees.—Page 84.

Harnischfeger Corp., Milwaukee, revises housing division to make prefabricated units for building construction.—Page 84.

General Electric Co. orders during the first quarter are 33 per cent above the like period of 1938.—Page 85.

American Foundrymen's Association announces three major medal awards.—Page 85.

England will need American scrap, says report from London.—Page 85.

Reports increase in order backlog for Niles-Bement-Pond.—Page 85.

Study and utilize sales promotion to survive, J. H. Van Deventer tells Industrial Marketers of Cleveland.—Page 90.

Society for Advancement of Management at Toledo to hear description of General Motors employee benefit fund.—Page 53.

Machine Tool Dealer defined under Public Contracts Act.—Page 110.

Pullman Standard Car Mfg. Co. engineer reports 80 lightweight trains in use.—

United States Steel Corp. finished steel shipments in March were 767,910 tons against 677,994 tons in February.

Home building in March rose to the highest level since October, 1929, a gain of 32 per cent over March, 1938.

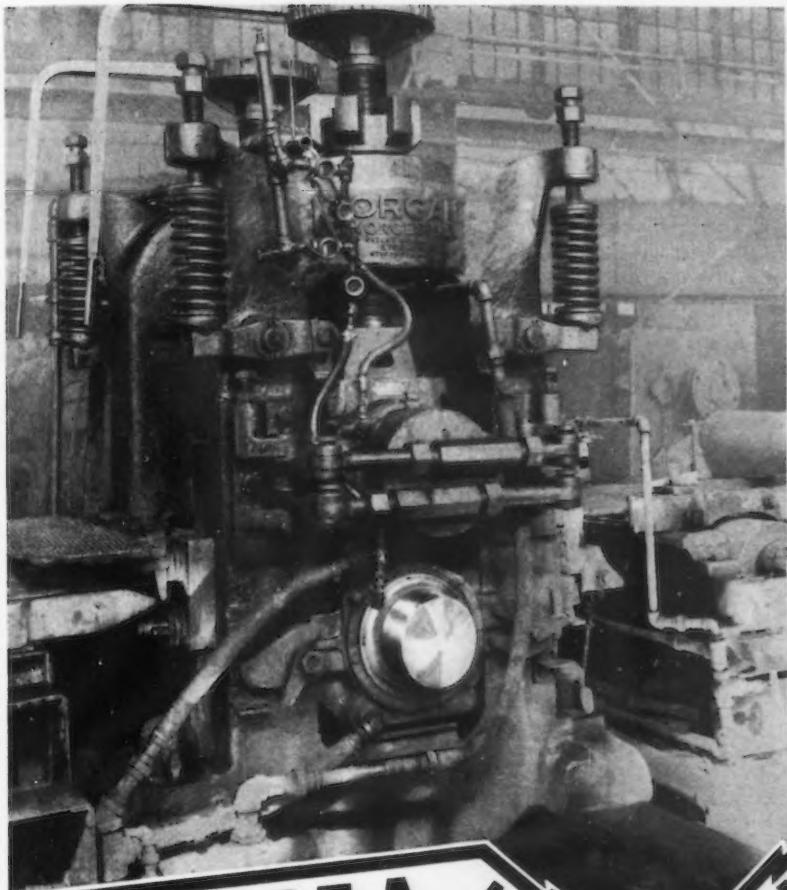
The 1939 edition of "Metal Statistics" issued.

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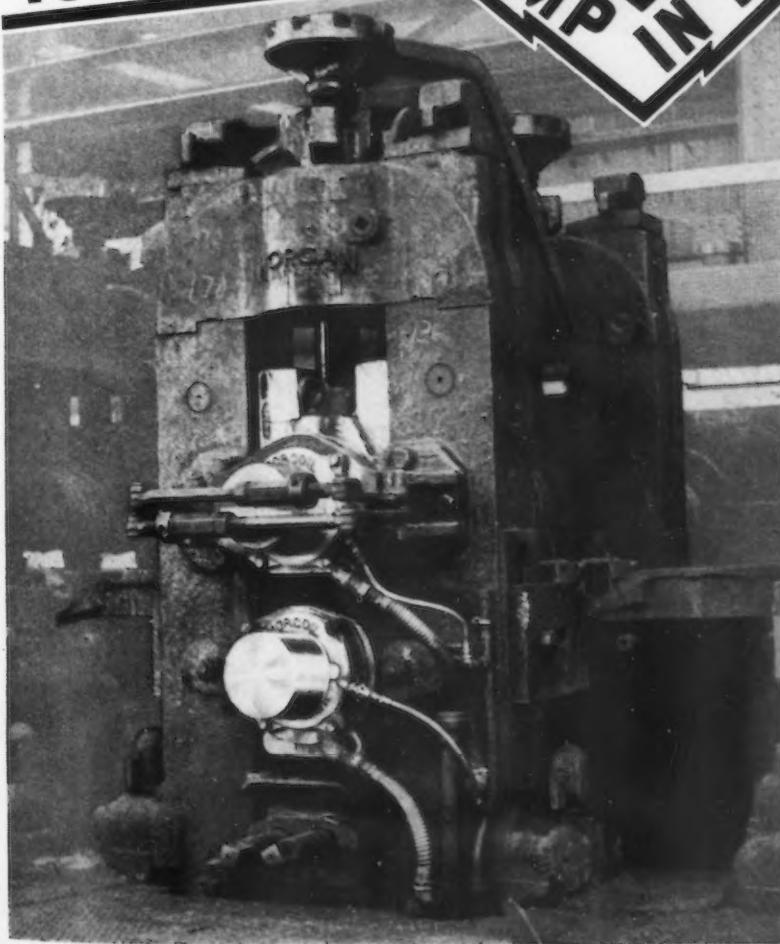
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MEETINGS

April 17 and 18—American Zinc Institute and the Galvanizers Committee, St. Louis.	
April 20 and 21—Concrete Reinforcing Steel Institute, Augusta, Ga.	
April 26 to 29—Electrochemical Society, Columbus, Ohio.	
May 15 to 18—American Foundrymen's Association, Cincinnati.	
May 16 and 17—American Steel Warehouse Association, Chicago.	
May 22 to June 8—Society of Automotive Engineers, world congress, in various cities.	
May 24 and 25—National Metal Trades Association, Chicago.	
May 25—American Iron and Steel Institute, New York.	
May 25 to June 1—Triple Convention (American Supply and Machinery Association, the National Supply and Machinery Distributors' Association and the Southern Supply and Machinery Distributors' Association), on board the S.S. Monarch of Bermuda.	
Oct. 23 to 27—National Metal Congress, Chicago.	



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R-53

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Dues Check-Off in U. S. Steel Plants Discussed by SWOC

C LAIRTON, PA.—More than 100 SWOC delegates from U. S. Steel Corp. plants met here recently to "air their grievances" in a meeting with Elmer J. Maloy, SWOC national grievance officer. Discussion included plans to obtain "some sort of a check-off system" for dues collections at U. S. Steel

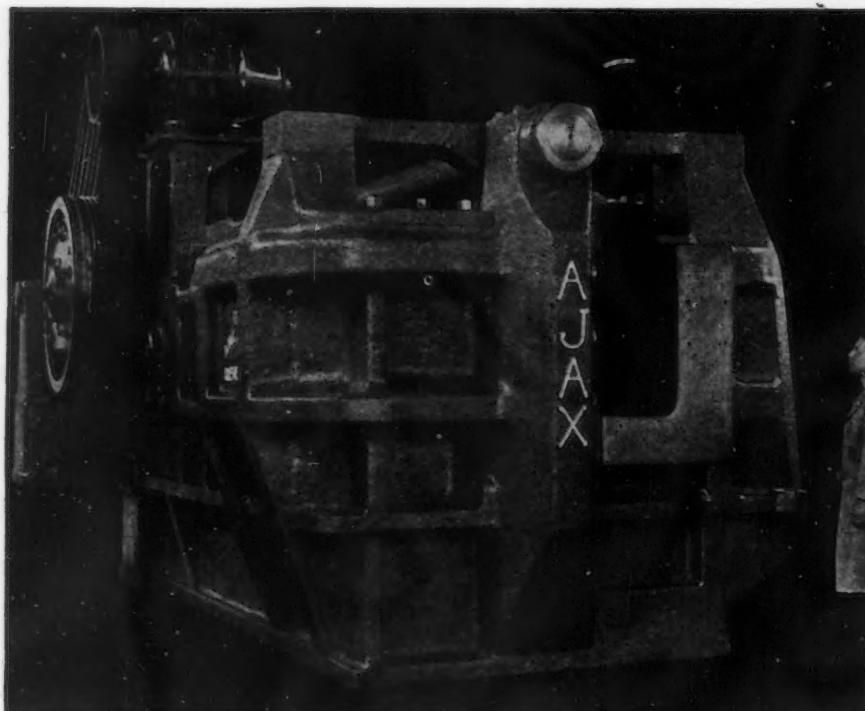
plants, revamping present grievance-settling machinery in current contracts, and heated debates over alleged arbitrary attitudes on the part of foremen and general superintendents.

The meeting here is one of a series. Since the group has no official status, action on the matters discussed would

have to be initiated in accordance with contract provisions.

It is likely, however, that the more important "kicks," especially those dealing with an attempt to obtain a check-off system for collection of dues, will come up at the next SWOC constitutional convention. Recent collection campaigns have been looked upon with disfavor by both steel companies and the national office of the SWOC, but both groups have remained silent following the disturbances.

U. S. Steel Corp. plants have contracts with the SWOC on behalf of union members only.



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● A feather touch on the foot valve—a puff of air—and this huge Forging Machine swings into action! Thousands of times a day in the world's most progressive forge shops, the Ajax Air Clutch is repeating its cycle—daily setting new production records on all types of upset forgings.

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AJAX

Harnischfeger Revises Steel House Division

M ILWAUKEE—Objectives of the steel house division of the Harnischfeger Corp., Milwaukee, have recently been changed from the manufacture of prefabricated residences to the production of prefabricated units for building construction, according to Harry McManus, sales manager of the division. Following an extensive study of the situation in eastern territory, he said, it was found that set package designs did not meet the wishes of architects and owners as to individuality. It was also necessary to make adequate provisions to meet a variety of building codes and laws of various communities. Under the new program, the steel framed panels, which were the nucleus of prefabricated houses, are used for the framing of buildings, for floors and ceilings without destroying individuality of interior or exterior designs. As the result of change in the program, the steel houses division plant is being retooled preliminary to the changeover.

Republic Will Offer Vacations or Extra Pay

C LEVELAND — Republic Steel Corp. and its subsidiaries again will give paid vacations this year to all employees with three or more years service. Vacations will be based on service records May 1, 1939, and are to be taken between May 1 and Dec. 31. Persons who prefer pay to vacations may receive the amount equal to vacation pay during the first half of December. Employees with from three to five years' service will have three days' vacation; five to 10 years, six days; 10 to 15 years, eight days, and 15 or more years, 10 days. The plan is the same as last year, company officials said.

England Will Need American Scrap

LONDON—The International Scrap Cartel mission to the United States is expected back in London shortly. The three members—Capt. H. Leighton Davies, Harold Schillito, and E. B. Muscroft—are all members of the British Iron and Steel Federation, which provides the agency for cartel contracts.

The primary object of the mission was not to negotiate orders for American scrap, and no important orders have been reported as a result. The discussions held will, however, facilitate orders which, in view of the expanding demand of British steel works, cannot now be long delayed.

It is understood that the price question was discussed at length, and here difficulty was encountered due to the fact that the American dealers desired to increase the price from \$15 to \$16 a ton.

The decision of the British Government to establish a shipping reserve for use in an emergency will mean the withdrawal of a number of vessels from the shipbreaking market. This should stimulate the demand for American scrap.

Burt Reports Increase in Order Backlog for Niles-Bement-Pond

UNFILLED orders of Niles-Bement-Pond Co., Hartford, are now above the Jan. 1 figure, R. C. Burt, president, told stockholders last week. The percentage of domestic business has shown quite a noticeable improvement during the past two months as compared with foreign business, which last year accounted for about 50 per cent of the total sales volume. Mr. Burt pointed out that, although the machine tool industry as a whole experienced a decline of about 45 per cent in 1938, Niles-Bement-Pond's volume dropped only about 20 per cent, compared with the volume of 1937.

G-E Orders Up Third During First Quarter

ORDERS received by the General Electric Co. in the first quarter of 1939 amounted to \$86,882,953 compared with \$65,376,400 for the corresponding period in 1938, an increase of 33 per cent, Gerard Swope, president, announced.

Foundrymen Announce Winners of 3 Awards

THE American Foundrymen's Association at its 43rd annual convention in Cincinnati, May 15 to 18, will make three major medal awards. Donald J. Campbell, president, Campbell, Wyant & Cannon Foundry Co., Muskegon, Mich., will receive the W. H. McFadden gold medal in recognition of the outstanding accomplishments of his company in casting

manufacturing processes. The John A. Penton gold medal is being given to Harold S. Falk, vice-president and general manager, the Falk Corp., Milwaukee, in recognition of his leadership in promoting interest in foundry apprentice training. For his engineering contributions to the association and to the foundry industry, James R. Allan, assistant manager of industrial engineering and construction, the International Harvester Co., will receive the J. H. Whiting gold medal.



The New 2½' Super-Service Radial

Offers advantages of size, economy, ease of handling, power and floor space savings, and the adaptability of pick-off gears. Designed especially for production drilling, tapping and reaming of holes up to $\frac{3}{4}$ " diam. in steel or 1" in cast iron, every feature to promote fast, easy handling, long life and safety is incorporated. Write for Bulletin R-26 giving complete information.

THE CINCINNATI BICKFORD TOOL CO.
OAKLEY CINCINNATI OHIO U.S.A.

... OBITUARY ...

HUGH RICHARDS, manager of the sheet and strip sales department of American Rolling Mill Co., died in Good Samaritan Hospital, Middletown, last Wednesday. He was 49 years old. Born in Penarth, Wales, Mr. Richards came to America when a boy and was first associated with Armco as clerk of purchases in 1913. Through successive promotions he became sales manager of the sheet and strip divisions in 1937. Last November, Mr.

Richards was injured in an automobile accident, the result of which brought complications terminating in his death last week.

* * *

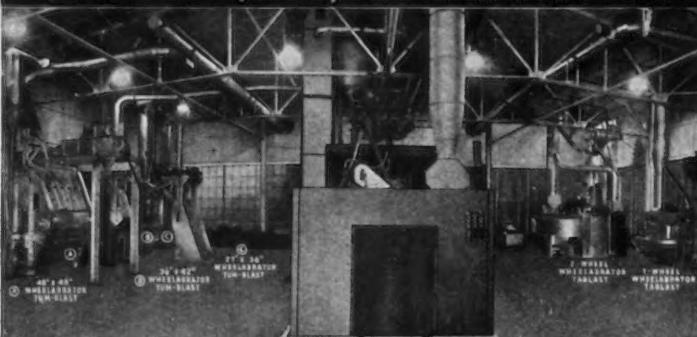
T. S. GRUBBS, vice-president, Union Switch & Signal Co., Pittsburgh, died April 2 at his home in Pittsburgh. Mr. Grubbs became a clerk with the Westinghouse Machine Co. in 1888 and when that company merged with the Westinghouse Electric & Mfg. Co. in 1915, he became secretary and auditor. That same year he went with Union Switch & Signal Co. as secretary and

in 1918 took over the duties of treasurer. In 1919 he became vice-president. He was elected comptroller of the Westinghouse Airbrake and subsidiary companies in 1927. He retired from his various duties last year with the exception of the vice-presidency of Union Switch & Signal.

* * *

HENRY A. WISE Wood, chairman of the Wood Newspaper Machinery Corp., Plainfield, N. J., died at his home in New York on April 9, aged 73 years. He became interested in printing at an early age and later invented the autoplate, a machine for casting the printing plates that fit on the

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WHEELABRATING—the airless abrasive blasting process for cleaning and finishing metals—has been installed in nearly 700 plants within the last five years. As many as 39 machines are used by individual concerns.

This unusual record of acceptance can be attributed not only to the greatly reduced cleaning costs which WHEELABRATING effects, but also to the superior finishes it produces to suit individual requirements.

What WHEELABRATING has done for others it can do for you. To satisfy yourself on this score, why not investigate this remarkable process? You be the judge. Let WHEELABRATING prove itself from every angle. A test is all we ask. Just ship us samples of your work for a test-cleaning in our laboratory. Your engineers can watch the demonstration. And from past experience we believe the results will open their eyes.



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HUGH RICHARDS

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* * *

COL. SAMUEL M. NICHOLSON, president of the Nicholson File Co., died on April 7, following an illness of several months. He was 78 years old. Colonel Nicholson developed the business founded by his father until it attained world wide prominence. He was also president of the American Screw Co. and a director of several banks and insurance companies.

* * *

FRANK FORREST BEALL, 61 years old, died suddenly April 6 in his office in the David Stott Building, Detroit. Mr. Beall was born in Derwood County, Md., but went to Detroit in 1907 and since that had been identi-

fied with the Packard Motor Car Co. and the Continental Motors Corp. At the time of his death he was president and treasurer of Saylor-Beall Mfg. Co., manufacturing company, 1501 East Philadelphia Avenue, Detroit. Mr. Beall was a graduate of the Rhode Island School of Design. He was a member of the American Society of Mechanical Engineers and the Engineers Club of New York.

* * *

JOSEPH W. CRIST, 54 years old, of the engineering staff of the Chrysler Corp., died in Henry Ford Hospital, April 5. Mr. Crist was born in Rochester, N. Y., but lived in Ypsilanti from the age of three. There, he and his brother, George W. Crist, pioneered in the automobile field and built one of the early cars. In 1906 he went to Detroit and over a period of years worked for Ford, Studebaker and Dodge. He was with the Dodge division of the Chrysler Corp. until six years ago as chief inspector. He then transferred to the diesel division of Chrysler where he worked as an engineer. His brother, George W., is assistant chief engineer of Cleveland Graphite Bronze Bushing Co.

* * *

WALTER GEIL, president of the Reliable Plating Works, Milwaukee, died on April 5, aged 56 years. He was born in Milwaukee, and after a connection with the Allis-Chalmers Mfg. Co. for 25 years, became president of the plating firm in 1932. Mr. Geil was a member of the American Electroplaters' Society.

* * *

MATTHEW J. HOFF, from 1919 to 1932 vice-president and general manager of the Great Lakes Malleable Corp., Milwaukee, died recently, aged 50 years. He was a graduate of Cornell University, class of 1912, and served overseas with the 80th division of the 305th engineering corps during the World War, leaving the service as a major. Mr. Hoff has been ill seven years.

* * *

O. E. SLEIGHT, 71 years old and a pioneer in the automotive industry, was buried April 8 at Lansing, Mich. Mr. Sleight was first connected with the industry with R. E. Olds in the curved-dash era. He joined Ralph Owen when the Owen Motor Car Co. was formed, later going to the Hudson Motor Car Co. He became associated with O. J. Beaudette of Auto Top and Trim Co., Pontiac, Mich., when the latter obtained the contract for paint-

ing Ford bodies. He was in charge of the paint department of the Oakland Motor Car Co. plant later and then joined William C. Durant in Lansing in charge of the Durant painting department.

* * *

ELBORN T. WARD, Wisconsin manager of the Dearborn Chemical Co., Chicago, died on April 3, aged 70 years. He was born in Troy, Pa., and was assigned to his post in Milwaukee in 1900.

GEORGE FURBER LIBBEY, sales manager and advertising manager of the Master Lock Co., Milwaukee, manufacturer of laminated steel locks, died on April 2, aged 37 years. He joined the concern in 1924 and made trips to foreign lands in the line of his duties.

* * *

ELMER H. BERGSTROM, for 15 years connected with the Lincoln Electric Co., Cleveland, as an engineer in foreign countries, died recently at Cleveland after a long illness.

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MONTHLY SHIPMENTS OF FINISHED STEEL PRODUCTS BY UNITED STATES STEEL CORP.—GROSS TONS											
Month	1935		1936		1937		1938		1939		*Per-Cent of Capacity
	Shipments	Per Cent of Capacity	Shipments	Per Cent of Capacity	Shipments	Per Cent of Capacity	Shipments	Per Cent of Capacity	Shipments	Per Cent of Capacity	
January	534,055	31.9	721,414	44.8	1,149,918	75.4	518,322	33.7	789,305	51.8	
February	583,137	39.2	676,315	45.3	1,133,724	82.5	474,723	35.5	677,994	49.3	
March	668,056	41.5	783,552	50.5	1,414,399	92.7	572,199	37.2	767,910	50.4	
April	591,728	36.7	979,907	63.2	1,343,644	91.0	501,972	33.7	.....	.....
May	598,915	35.8	984,097	63.4	1,304,039	85.5	465,081	30.2	.....	.....
June	578,108	36.7	886,065	57.1	1,268,550	85.8	478,057	32.1	.....	.....
July	547,794	34.0	950,851	61.3	1,186,752	77.9	441,570	28.8	.....	.....
August	624,497	37.3	923,703	59.6	1,107,858	72.6	558,634	36.3	.....	.....
September	614,933	39.7	961,803	62.0	1,047,962	71.1	577,666	37.5	.....	.....
October	686,741	41.1	1,007,417	62.6	792,310	52.0	663,287	43.1	.....	.....
November	681,820	42.3	882,643	59.2	587,241	39.7	679,653	45.6	.....	.....
December	661,515	42.7	1,067,365	68.8	489,070	32.1	694,204	45.2	.....	.....
Minus yearly adjustment	(—23,750)	...	(—40,859)	...	(—77,113)	...	(+30,381)	...	.....	.....
Total for year	7,347,549	38.1	10,784,273	58.2	12,748,354	70.4	6,655,749	36.7	.....	.....

*Annual finished steel capacity 17,940,600 gross tons, with monthly percentages based on actual number of weeks in each month.

Steel Corp. Shipments at 50.4 Per Cent in March

SHIPMENTS of finished steel products by subsidiary companies of the U. S. Steel Corp. in March were 767,910 tons, or 50.4 per cent of finishing capacity. This compares with 677,994 tons, or 49.3 per cent, in February, and 572,199 tons, or 37.2 per cent, in March a year ago.

Cumulative total of shipments for the first three months of the current

year is 2,235,209 tons against 1,565,244 in the comparable period of 1938, an increase of 42.8 per cent.

1939 "Metal Statistics" Issued

THE 1939 edition of Metal Statistics, a 632-page, 6 x 4 in., hard cover book containing statistical information on ferrous and non-ferrous metals and related economic subjects, is now being distributed. Copies may be obtained at \$2 each from the American Metal Market, 111 John Street, New York.

March Track Shipments Highest Since Sept., 1937

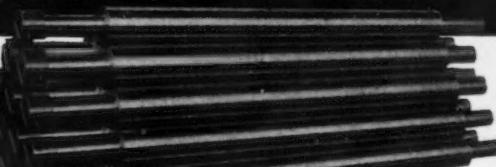
SHIPMENTS of trackwork for T-rail track, weighing 60 lb. per yd. and heavier, rose sharply in March to 6481 net tons, the highest monthly total since September, 1937, according to the American Iron and Steel Institute. In February shipments were 4250 tons and in March, 1938, were 4822 tons. Shipments in the first quarter of the present year amounted to 13,640 tons, the highest quarterly total since the last quarter of 1937.

MCKAY HARDENED ALLOY TOOLED STEEL ROLLS



3 1/4" x 54"

4 1/4" x 66"



5 1/4" x 84"

4 1/2" x 36"

2 1/2" x 42"

10" x 104"

WHEREVER steel sheets are processed and leveled, the McKay Alloy Tool Steel Rolls are recognized for their long life and outstanding performance.

The McKay Machine Company is the largest manufacturer of Alloy Tool Steel Rolls for roller levelers and sheet processing equipment in the world.

THE MCKAY MACHINE CO.

ENGINEERS AND MANUFACTURERS OF SHEET, TIN AND STRIP MILL EQUIPMENT
YOUNGSTOWN, OHIO

... PIPE LINES ...

El Paso Natural Gas Co., El Paso, Tex., has approved plans for new welded steel pipe line from connection with present system near Lordsburg, N. M., to Duncan, Stafford, Miami and Globe, Ariz., about 190 miles, for natural gas transmission. Control stations and operating facilities will be installed for service in these communities, with compressor stations for booster purposes along route. Cost over \$1,000,000.

Warren Petroleum Corp., National Bank of Tulsa Building, Tulsa, Okla., has let contract to J. F. Pritchard & Co., Dwight Building, Kansas City, Mo., engineers and contractors, for steel pipe line gathering system in Fairbanks gas field, Harris County, Tex., including welded steel pipe line for main service for new natural gasoline plant in that district. Lines will have a capacity of about 30,000,000 cu. ft. of natural gas per day. Entire project will cost about \$500,000.

General Purchasing Officer, Panama Canal, Washington, asks bids until April 17 for about 60,000 ft. of galvanized welded steel pipe, and about 1200 ft. of plain welded steel pipe (Schedule 3439).

Socony-Vacuum Oil Co., 26 Broadway, New York, plans new 10-in. welded steel pipe line from Woodriver, Madison County, Ill., to Lima, Ohio, with branch line connecting with oil field district in Illinois basin, recently developed by company, about 360 miles in all, for crude oil transmission. At Lima connection will be made with existing pipe lines to Trenton, Mich., and Buffalo, where refineries are located, to furnish supply both of Illinois and Mid-Continent crude oil to these plants. Cost reported over \$3,500,000 with pumping stations and other operating facilities.

Amere Gas Utilities Co., Beckley, W. Va., plans welded steel pipe line to Mullens, W. Va., for natural gas transmission. Franchise has been granted for furnishing service to city. Municipality has called special election on April 22 to vote on acquisition of municipal pipe line system and will make extensions and improvements to handle supply from source noted, including control station and other operating facilities.

Aloco Oil Co., Midland, Tex., will proceed with construction on new 6 and 8-in. pressure pipe lines from Denver oil field area, Yoakum County, and oil field district in Gaines County, both Texas, to connection with main trunk line of Atlantic Refining Co., at Hobbs, N. M., about 31 miles, for crude oil transmission.

Louisiana-Nevada Transit Co., Cotton Valley (Webster Parish), La., plans welded steel pipe line to Hope, Ark., for natural gas transmission. A 10-year franchise has been secured from municipality. Right of way is being secured and surveys will be made at once.

Peoples Natural Gas Co., Aquila Court Building, Omaha, Neb., plans pipe line system for natural gas distribution at Woodward, Iowa, where franchise has been granted; also main welded steel pipe line connection for supply to municipality, with control station and other operating facilities.

CAST IRON PIPE

Newport, R. I., through Joseph DeCicco Co., Stoneham, Mass., contractor, has awarded 500 tons of various sized pipe to R. D. Wood & Co.

Swampscott, Mass., has awarded a tonnage of 12 and 14-in. pipe to United States Pipe & Foundry Co.

Galax, W. Va., plans pipe line extensions in water system. Cost about \$29,700. Financing in part has been secured through Federal aid.

La Grange, N. C., plans pipe line extensions and replacements in water system and other waterworks installation. Special election has been called on April 18 to approve bond issue for \$220,000 for this and municipal electrical distribution system.

Muscatine, Iowa, plans pipe line extensions in water system, also new 300,000-gal. water reservoir and pumping equipment. Cost about \$37,000. Financing is being arranged through Federal aid.

Callender, Iowa, closes bids April 21 for pipe lines for water system; also for elevated steel tank on steel tower, and deep-well pumping equipment. Currie Engineering Co., Webster City, Iowa, is consulting engineer.

Dorchester, Wis., plans waterworks system estimated to cost about \$30,000.

Fairchild, Wis., has received WPA allotment of \$32,230 for water supply system.

Poynette, Wis., plans extension of waterworks system costing \$60,000 as PWA or WPA project. Neither fund yet allotted.

Stoddard, Wis., has applied for \$36,000 of WPA funds for construction of waterworks system.

Huntington Park, Cal., closes bids April 17 for 1500 ft. of 6-in., and 1000 ft. of 4-in. pipe for water system.

Platte County Water Co., Parkville, Mo., plans new main water pipe line from Lake

Weatherby to Parkville, by way of Platte Woods Addition; also pipe lines for extensions in distributing system at Parkville, and expansion and improvements in local filtration plant. Cost about \$150,000. Henrici-Lowry Engineering Co., 114 West Tenth Street, Kansas City, Mo., is consulting engineer.

Beaumont, Tex., asks bids until April 18 for 10,700 ft. of 8-in., and 13,400 ft. of 6-in. pipe for water system.

Dorchester, Wis., plans pipe lines for water system; also other waterworks installation. Cost about \$30,000. Frank J. Davy & Son, 502 Main Street, LaCrosse, Wis., are consulting engineers.

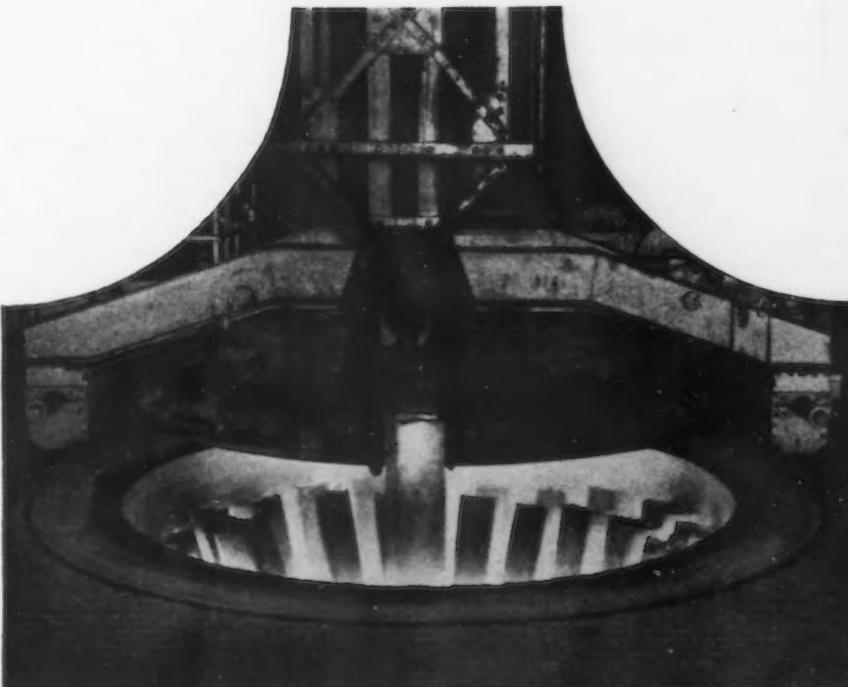
Lewistown, Mont., asks bids until April 20 for pipe for water system; also for steel pipe for main supply lines. Financing has been arranged through Federal aid. J. M. Schmidt is city engineer.



SALEM CIRCULAR SOAKING PITS

Capacity far greater than conventional type pits, greater control is afforded by the circular design and construction—proved economy. Far more than merely heating units—"Salem" Circular Soaking Pits are heat treating furnaces, imparting to the ingot a splendid condition, acknowledged by the men who use them. Originated and developed by "Salem".

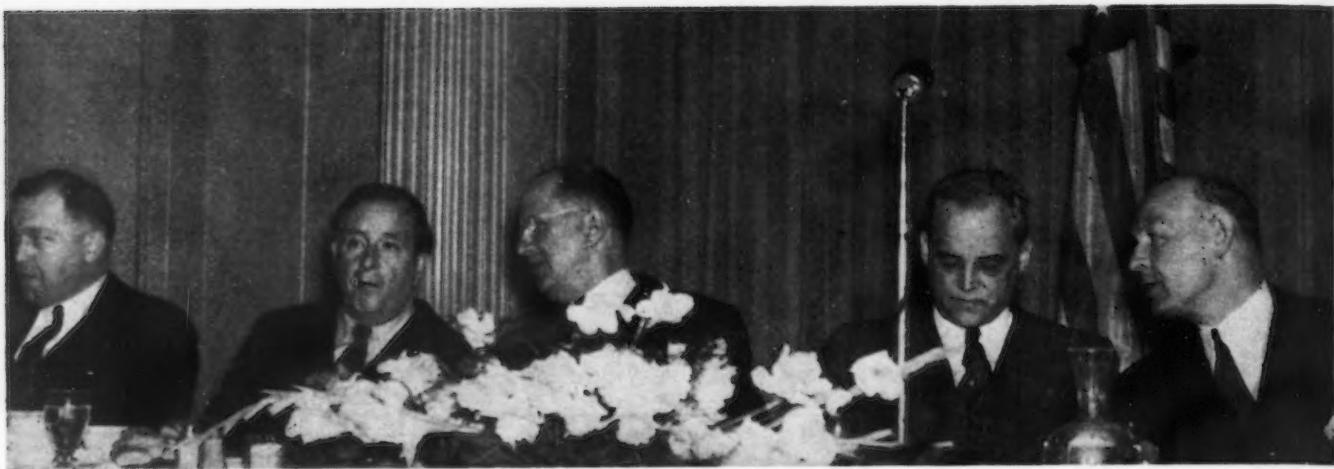
MAKE STEEL "RIGHT" AT THE START



SALEM, OHIO, U.S.A.

Chicago—Detroit—Pittsburgh—New York
London—Paris—Berlin—Welland, Ontario

SALEM ENGINEERING COMPANY



FOUR hundred executives attended a luncheon meeting of the Industrial Marketers of Cleveland April 7 to hear John H. Van Deventer, editor, THE IRON AGE. Partial view of speakers' table shows, left to right, Earl Shaner, president, Penton Publishing Co., who introduced Mr. Van Deventer; A. C. Ernst, president, Cleveland Chamber of Commerce; Mr. Van Deventer; Mayor Harold H. Burton of Cleveland, and Stanley Knisely, president, National Industrial Advertisers Association.

Speed Up Sales Promotion to Live, Editor Tells Industry

CLEVELAND—In sales promotion, American industry which is protecting its 40,000,000 workers with only a 4 per cent safety factor, has a powerful machine not fully utilized for generating order volume, John H. Van Deventer, editor of THE IRON AGE, told 400 executives here April 7.

The meeting, held by the Industrial Marketers of Cleveland in the main ball room of Hotel Statler, was told that whereas 80 per cent of American industrial executives are thoroughly aware of the profit-making possibilities of improved machinery and equipment, and probably 50 per cent are aware of the profit possibilities of design and engineering, not more than 10 per cent are fully aware of the profit-making possibilities of modern sales promotion.

This is because production and design are tangibles, while promotion is largely intangible, and because the environment of engineering and production, while progressive, is comparatively stable, Mr. Van Deventer said.

The margin between solvency and bankruptcy figured over an average of 15 years, is not more than 4 per cent, he continued, contrasting this "safety factor" with the 300 to 1000 per cent margin allowed in engineering practice.

"The live weight, useful, paying load on the bridge of business is not increasing, but the deadweight load is getting heavier year after year," he said. "The deadweight load is going

in every line of business. Costs that management cannot control. The cost of government, which is a part of the overhead of every business in this country, has gone up much faster than the cost of production has gone down.

"The dead weight of public debt resting upon the bridge of American enterprise is equivalent to 2½ million tons of silver dollars.

"And so what has management left to control in its struggle to save its vital 4 per cent safety factor? Just two important things. One is productivity per man hour. The other is volume of business.

"American industry is doing a good job in the control and improvement of productivity per man hour. It is not doing so well with the control of volume. The reason for this is that management understands the use of machinery better than it understands and appreciates the power of promotion. It has learned more about handling things than it has about handling ideas. More about how to make good products than how to make good people want to buy them.

A Greener Pasture

"I would not have management abate one iota of its progressive policy of equipment modernization and its constant search for improved methods of production. That would be suicidal. But I would have it come to better understand and better utilize the potentialities of promotion. Today, there is more grass in that pasture.

"Consider for a moment the two approaches to profit; one through economies in production; the other through increased volume.

"Economies in production are secured piece-meal, not on a broad front. A machine here and there, among several hundred, is selected for replacement.

"Increased sales volume, on the other hand, operates on a broad front. And quickly. We have seen it, in the steel industry, change a red ink figure of millions into a black ink figure of millions within the space of six months. I have never seen an improved machine do that.

"It has been almost incomprehensible to me why management, which can detect some physical phenomenon and can put it to work profitably through production tools, has not recognized the profit possibilities of sales promotion at or near the break-even point. That is the time your promotion efforts should be doubled and redoubled. That is the time when modern sales promotion, by increasing volume even a little, will pay big dividends in increased profits or decreased losses.

"Promotional sales effort, like modern production machinery, is unlimited as to capacity. You can speed it up 10, 20, 100 or 1000 per cent overnight.

"There is one big thing that you promotion men have left undone. You have been so occupied in thinking up

ways and means to promote your companies' businesses that you have neglected to promote yourselves. Sales promotion needs sales promotion. And right at home.

"Top management . . . will have to keep on searching for better designs, better methods, better machines for production. It will have to do whatever it can to stimulate the efforts of personal salesmanship and make it more effective. But most of all, it will have to capitalize and put to work the powerful intangibles of promotion. It will have to fit an adequate and full sized money-motor to the powerful promotion machine that is now idling or running at best at half power."

Mr. Van Deventer was introduced by Earl Shaner, president, Penton Publishing Co., Cleveland, and editor-in-chief of "Steel" magazine.

Mayor Burton Attends

Paul Teas, president of the Industrial Marketers of Cleveland and a director of the National Industrial Advertisers' Association, directed the meeting. Guests at the speakers table included: Mayor Harold Burton of Cleveland, A. C. Ernst, president, Cleveland Chamber of Commerce; Tell Berna, general manager, National Machine Tool Builders' Association; Stanley Knisely, president of the National Industrial Advertisers' Association and advertising manager of Republic Steel Corp.; John F. Patt, president, Cleveland Advertising Club; D. Clinton Grove, Pittsburgh, of the Blaw-Knox Co. and a director of N.I.A.A.; Richard P. Dodds, advertising manager of Truscon Steel Co., Youngstown, and first vice-president of N.I.A.A.; Lloyd Ellingwood, president, Toledo Industrial Advertisers group; Charles J. Ford, president, Cleveland Junior Association of Commerce; A. H. Van Horn, president, Cleveland Engineering Society; Paul Bellamy, editor, *Cleveland Plain Dealer*; Louis Seltzer, editor, *Cleveland Press*; N. R. Howard, editor, *Cleveland News*.

The McKay Co., manufacturer of McKay tire chains, McKay commercial chain, and McKay arc-welding electrodes, is transferring from Pittsburgh office its general sales, order, invoicing, and purchasing departments to the York, Pa., factory, where the majority of operations are centered.

Donald S. Laughlin, president of Thomas Laughlin Co., of Portland, Me., manufacturers of industrial and marine hardware, has appointed the John E. Livingstone Co. as representative in the Detroit territory. The address of the Detroit sales office remains 2921 East Grand Boulevard and the company will continue to warehouse stocks in Detroit.

March Home Building Touches 10-Year Peak

ACTIVITY in the construction industry continues to show substantial month-to-month improvement. In March, contracts for residential buildings rose to the highest level since October, 1929, according to the F. W. Dodge Corp. The month's total of \$300,661,000, covering all types of light construction, represents a gain of 36 per cent over February and 32 per cent over March, 1938. Private ownership registered the largest gains in March, with the record for this class being 58 per cent ahead of February, while public work gained only 16 per cent.

Heavy engineering construction also continues to expand. Awards totaling \$285,566,000 were placed in March, according to *Engineering News-Record*, representing, on a weekly average basis, the highest for any month since March, 1931, and an advance of 12 per cent over both the February and March figures.

Heavy construction awards in the first quarter of the present year were \$801,102,000, the highest first quarter volume since 1930, and 22.4 per cent above the corresponding period of 1938. Light construction in the March quarter were the highest of any quarter in eight years. The gain over the first quarter of 1938 was 44 per cent

and over the corresponding quarter of 1937 was 17 per cent.

Late Personals

J. A. GEISMER has been appointed president of National Supply Co., Pittsburgh, succeeding JOHN M. WILSON, who has been made chairman of the board. A. E. WALKER, as reported in the March 30 issue of THE IRON AGE, becomes vice-president and a member of the board. C. A. MEYER has been made treasurer; R. W. EILER, secretary, and C. R. BARTON, E. H. GREEN, and D. S. FAULKNER have been made vice-presidents.



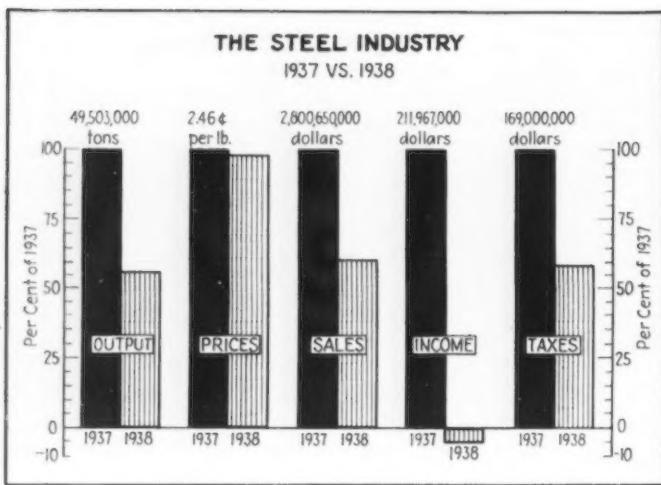
JOHN E. DIXON has been elected president of Lima Locomotive Co. For many years he has served as vice-president, following service in the sales and engineering departments.

Late Obituary

WALTER C. ENGLISH, for many years New England manager of THE IRON AGE, died April 9 at his home in Brookline, Mass. Mr. English was born in Salem, N. J., 76 years ago. He went to Boston in 1884 as New England manager of THE IRON AGE. He retired in 1910. Later he bought the *Brookline Chronicle*, which he ran successfully for several years.

The first regional foundry conference ever held in the Metropolitan New York, New Jersey and Eastern Pennsylvania districts by chapters of the American Foundrymen's Association, was held recently at Rutgers University, New Brunswick, N. J., and was attended by over 200 foundrymen. Shown seated at the speakers' table at the banquet that concluded the conference are, left to right, Don J. Reese, International Nickel Co., New York; W. A. Phair, THE IRON AGE, New York; Edwin C. Barringer, executive secretary, Institute of Scrap Iron and Steel; Marshall Post, vice-president, Birdsboro Steel Foundry & Machine Co., Birdsboro, Pa., and national president, American Foundrymen's Association; Prof. M. J. Bailey, Rutgers University; Sam Tour, Lucius Pitkin, Inc., New York, and Prof. W. C. Schulte, Rutgers University.





IN 1938 the American steel industry operated at a loss exceeding \$10½ million, a sum equal, after all preferred dividend requirements, to \$1.70 a common share. This deficit amounted to a little more than a half cent per dollar of sales. The industry's net sales for the year amounted to a little over \$1,750,000,000 and total assets at the end of the year were \$4,518,040,000. This compares with a profit of over \$212,000,000, equal to \$5.11 per common share and sales of more than \$2,950,000,000 in 1937. These conclusions are based on a financial survey of the steel industry made by THE IRON AGE and presented on the adjoining page. The survey's data for 1938 cover 22 companies having 93 per cent of the country's ingot capacity.

In many respects 1938 was of unusual significance. Output shrunk to 1934 levels, prices suffered from severe competition and changes of immense importance were made in the industry's basic pricing policy. While it is yet too early to be able to appraise accurately the full effect of these pricing changes, it is, however, fairly evident that they will have a depressing effect on a considerable part of the industry.

In presenting the 1938 analysis, several alterations have been made in the form used in the past. In the current tabulation, the amount of dividends paid, both common and preferred, has been included, and the companies analyzed have been divided into two groups—special steel producers and producers who, while turning out some tonnage of special steels, concentrate the bulk of their production on regular carbon steels.

Data on the special steel producers are lacking in several respects and in-

TAXES paid in 1938 by the 22 companies included in the compilation on the adjoining page were in excess of \$91½ million, or about \$2.70 per common share. This burden would have been sufficient to pay all the preferred dividend requirements of those companies, with enough left over to pay common shareholders \$1.10 per share. An 11 per cent reduction in 1938's tax bill would have completely wiped out the industry's operating deficit for the year.

formation on the position of this fast growing section of the industry is rather sketchy. One interesting, al-

U. S. May Barter Cotton, Wheat for Rubber and Tin

WASHINGTON—War and Navy Department requirements of 85,000 net tons of tin for reserves estimated to cost \$65,000,000 would be largely, if not entirely, procured if the United States Government succeeds in the proposed direct barter of its surplus cotton and wheat holdings with England, Holland and other countries. The plan, designed to obtain strategic materials not adequately produced in this country, also contemplates the acquisition of at least 266,000 net tons of rubber for war reserves, estimated at a value of \$85,000,000.

Steel Industry's Loss of \$10½ Million in 1938 Compares with Profit of \$212 Million in 1937

By W. A. PHAIR

Associate Editor, *The Iron Age*

though not unsuspected, fact brought to light by this division, is the relatively higher capitalization per ton of ingot capacity of the special steel producers. The weighted average for this group is \$88.42, while for the carbon steel makers it is \$57.32. For the entire industry the average is \$58.13.

The past year saw another merger of two important companies, this time two special steel producers—Allegheny Steel Co. and Ludlum Steel Co. The financial data covering the company resulting from the merger, the Allegheny Ludlum Steel Corp., includes the results of the Allegheny company for the entire year and the Ludlum company only from Aug. 16, the date of the merger, to the end of the year.

Copies of the tabulation on the adjoining insert may be obtained by writing THE IRON AGE

The proposed barter plan was disclosed Monday by Senator Byrnes of South Carolina. That it has Administration support was made clear by the statement that the foreign countries concerned will be approached soon with the exchange offer.

The purchases of rubber and tin would be made through the director of the Procurement Division, Treasury Department, under the advice of the Secretaries of War and the Navy.

Under the plan it is proposed that the cotton and wheat exchanged by this country should be held by the purchasing governments for at least five years unless during that time the market price should go higher than set forth in the agreement. In return it is proposed that this government hold rubber and tin for five years.

A FINANCIAL ANALYSIS OF THE

NAME OF COMPANY	Ingot Capacity Gross Tons	Ingot Production Gross Tons	Per Cent of Capacity Operated	Net Sales	Net Income	Profit Margin Per Cent	Common Shares Outstanding	E C
United States Steel Corp.	1938 25,790,000	1937 25,790,000	9,397,371 18,532,278	36.2 72.1	\$632,533,383 1,086,762,477	\$7,717,454 94,944,358	1.2 8.7	8,703,252 8,703,252
Bethlehem Steel Corp.	1938 10,042,000	1937 10,042,000	4,348,186 7,269,828	43.3 77.7	265,999,937 418,556,528	5,250,239 31,819,596	2.0 7.6	3,183,984 3,185,114
Republic Steel Corp.	1938 6,500,000	1937 6,453,000	2,465,544 4,014,277	37.9 62.2	140,879,763 250,447,744	7,997,825 9,044,148	5.6 3.6	5,832,856 5,832,124
Jones & Laughlin Steel Corp.	1938 3,671,200	1937 3,671,200	1,358,626 2,472,395	37.0 67.5	75,410,901 117,471,743	5,879,958 4,788,799	7.8 4.1	576,320 576,320
National Steel Corp.	1938 3,400,000	1937 3,400,000	.....	.....	89,503,232 145,933,348	6,661,652 17,801,893	7.4 12.2	2,198,767 2,167,877
Youngstown Sheet & Tube Co.	1938 3,120,000	1937 3,120,000	1,185,600 2,009,280	38.0 64.4	84,664,566 144,288,797	658,934 12,190,649	0.8 8.4	1,675,008 1,675,008
American Rolling Mill Co.	1938 2,645,520	1937 2,551,120	1,084,663 ²	41.0 ²	70,441,606 114,857,600	1,307,880 8,231,335	1.9 7.2	2,869,560 2,869,560
Inland Steel Co.	1938 2,760,000	1937 2,340,000	1,490,400 1,750,320	54.0 74.8	74,058,924 110,744,037	4,916,203 12,665,317	6.6 11.4	1,577,005 1,573,950
Wheeling Steel Corp.	1938 1,750,000	1937 1,750,000	919,955 1,327,596	52.6 75.9	62,420,280 90,455,381	493,138 4,238,488	0.8 4.7	563,295 563,212
Colorado Fuel & Iron Corp. ³	1938 990,000	1937 888,000	379,170 615,481	38.3 69.3	20,118,984 26,953,435	829,363 1,207,849	4.1 4.5	563,620 553,125
Otis Steel Co.	1938 872,000	1937 872,000	.....	.....	13,718,500 31,989,204	1,230,297 2,320,031	9.0 7.3	915,751 896,509
Pittsburgh Steel Co.	1938 809,340	1937 809,340	379,000 583,000	46.8 72.0	10,261,712 35,359,261	778,509 1,391,665	7.6 3.9	499,442 354,900
Lukens Steel Co. ⁴	1938 637,800	1937 637,800	.....	.....	11,597,016 19,356,893	288,505 158,218	2.5 0.8	317,976 317,976
Sharon Steel Corp.	1938 500,000	1937 500,000	250,000 410,000	50.0 82.0	10,505,879 20,206,115	95,325 1,345,810	0.9 6.6	391,611 387,774
Granite City Steel Co.	1938 360,000	1937 360,000	.....	.....	6,359,472 13,234,442	330,231 254,225	5.2 1.9	382,488 382,488
Continental Steel Corp.	1938 325,000	1937 280,000	.....	.....	12,801,105 19,723,904	632,865 814,553	4.9 4.1	200,561 200,561
Laclede Steel Co.	1938 248,964	1937 248,964	.....	.....	.....	331,849 455,729	.....	206,250 206,250
Summary, 1938	64,421,824	23,258,515	39.7 ⁶	\$1,581,275,260 ⁵	\$8,828,335	0.6% ⁶	30,657,746	
Special Steel Producers								
Crucible Steel Company of America	1938 853,400	1937 963,350	.....	.....	29,125,598 59,852,703	2,237,026 4,017,931	7.7 6.7	445,198 445,698
Allegheny Ludlum Steel Corp.	1938 537,516	1937 129,400	25.1 ¹⁰	18,261,231	1,070,186	5.9	1,256,722	
Midvale Co.	1938 273,024	1937 273,024	.....	.....	1,244,210 1,341,816	.....	200,000 200,000	
Vanadium-Alloys Steel Co. ²	1938 40,000	1937 40,000	.....	.....	3,540,535 5,822,345	213,128 968,693	6.0 16.6	200,367 201,825
Rustless Iron & Steel Corp.	1938 45,000	1937 35,000	.....	.....	2,348,298 4,193,461	81,110 713,139	3.5 17.0	871,721 863,339
Summary, Special Steel Producers, 1938	1,748,940	129,400	25.1	\$53,275,662	\$1,768,764	3.3%	2,974,008	
SUMMARY, ALL PRODUCERS, 1938	66,170,764	23,387,915	39.6 ¹⁵	\$1,634,550,922	\$10,597,099	0.6% ¹³	33,631,754	

1—Net income before interest on funded debt.

2—Shipments, as reported by the company.

3—For fiscal year ended June 30.

4—For fiscal year ended Oct. 30.

5—Covers 16 companies, one not reporting.

6—Based on 16 companies reporting both net sales and net income.

7—After preferred requirements amounting to \$44,483,951.

8—Based on experience of 10 companies reporting ingot production

and one reporting shipments.

9—A weighted average, with respect to ingot capacity, of all companies.

10—Based on that portion of Ludlum Steel Corp. after A

Ludlum Steel Co. and Allegheny Steel Co.

11—Dividend of 1/75 share of preference stock but no cash dividends.

F THE STEEL INDUSTRY

Data cover the operation
of the ingot capacity

Profit Margin Per Cent	Common Shares Outstanding	Earnings Per Common Share	Earnings Per Ton of Ingot Capacity	Earnings Per Ton of Ingots Produced	Total Assets (000 omitted)	Funded Debt (000 omitted)	Preferred Stock (000 omitted)	Common Stock (000 omitted)	Combined Surplus (000 omitted)	1
1.2	8,703,252	\$3.78	\$2.99	\$0.80	\$1,711,279	\$243,712	\$360,281	\$652,744	\$285,882	\$1
8.7	8,703,252	8.01	3.68	5.12	1,918,729	120,572	360,281	870,325	361,606	1
2.0	3,183,984	0.70	0.52	1.21	699,474	175,127	112,066	302,479	64,863	
7.6	3,185,114	7.64	3.40	4.38	715,810	184,573	112,066	302,586	67,249	
5.6	5,832,856	1.78	1.23	3.24	348,716	89,082	40,190	132,517	58,711	
3.6	5,832,124	1.17	1.40	2.25	364,659	92,859	40,190	132,500	67,002	
7.8	576,320	17.34	1.60	4.33	227,654	49,959	58,714	57,632	44,290	
4.1	576,320	1.18	1.30	1.94	219,643	34,183	58,714	57,632	50,204	
7.4	2,198,767	3.03	1.96	....	207,145	62,748	None	54,969	71,390	
12.2	2,167,877	8.21	5.24	....	204,453	59,055	None	54,197	66,433	
0.8	1,675,008	0.89	0.21	0.56	241,720	87,000	15,000	105,057	20,819	
8.4	1,675,008	6.79	3.91	6.07	220,641	58,500	15,000	105,040	20,994	
1.9	2,869,560	1.16	0.49	1.21 ²	138,850	2,000	45,000	71,739	10,193	
7.2	2,869,560	2.55	3.22	....	145,845	3,658	45,000	71,739	12,624	
6.6	1,577,005	3.12	1.78	3.30	156,507	51,800	None	57,465	34,098	
11.4	1,573,950	8.05	5.41	7.24	158,326	52,900	None	57,312	33,152	
0.8	563,295	2.55	0.28	0.54	118,137	32,900	38,024	28,287	10,753	
4.7	563,212	4.03	2.42	3.19	123,551	33,600	38,131	28,283	11,060	
4.1	563,620	1.47	0.84	2.19	39,371	15,518	None	5,636	13,309	
4.5	553,125	2.18	1.36	1.96	52,010	15,518	None	5,531	13,373	
9.0	915,751	2.17	1.41	....	36,813	14,106	10,314	4,579	5,245	
7.3	896,509	1.72	2.66	....	39,026	14,251	10,674	4,483	6,608	
7.6	499,442	3.30	0.96	2.05	44,271	5,725	15,475	4,767	14,142	
3.9	354,900	1.86	1.72	2.39	42,736	6,707	10,475	3,549	17,620	
2.5	317,976	0.91	0.45	....	13,291	3,827	None	3,180	3,553	
0.8	317,976	0.50	0.25	....	15,692	3,851	None	3,180	3,842	
0.9	391,611	0.88	0.19	0.38	18,400	None	5,972	3,967	5,638	
6.6	387,774	2.83	2.69	3.28	17,343	Retired	5,972	3,898	5,821	
5.2	382,488	0.86	0.92	....	14,346	None	None	8,484	3,020	
1.9	382,488	0.66	0.71	....	14,840	None	None	8,484	3,398	
4.9	200,561	2.32	1.95	....	15,009	1,267	2,391	5,276	4,221	
4.1	200,561	3.20	2.91	....	14,230	1,277	2,455	5,277	3,960	
....	206,250	1.61	1.33	....	7,204	None	None	4,125	1,792	
....	206,250	2.21	1.83	....	7,113	None	None	4,125	1,718	
0.6% ⁶	30,657,746	\$1.74 ⁷	\$0.14	\$0.63 ⁸	\$4,038,187	\$834,771	\$703,427	\$1,502,903	\$651,919	\$3
7.7	445,198	8.77	0.26	....	109,277	11,750	23,880	44,520	26,111	
6.7	445,698	5.26	4.17	....	109,824	6,500	23,880	44,570	28,893	
5.9	1,256,722	1.04	2.07 ¹⁰	8.27	29,845	None	3,343	7,854	14,820	
....	200,000	6.22	4.56	....	14,766	None	None	10,575	1,791	
....	200,000	6.71	4.91	....	14,325	None	None	10,575	1,463	
6.0	200,367	1.06	5.33	....	6,017	None	None	1,422	4,297	
16.6	201,825	4.80	24.22	....	6,832	None	None	1,481	4,457	
3.5	871,721	0.12	1.80	....	3,687	None	1,189	871	1,109	
17.0	863,339	0.72	20.38	....	3,489	None	1,189	863	1,104	
3.3%	2,974,008	\$1.27 ¹²	\$1.01	....	\$163,592	\$11,750	\$28,412	\$65,242	\$48,128	
0.6% ¹³	33,631,754	\$1.70 ¹⁴	\$0.16	\$0.67 ¹⁵	\$4,201,779	\$846,521	\$731,839	\$1,568,145	\$700,047	\$3

—Based on that portion of Ludlum's capacity available to the Allegheny Ludlum Steel Corp. after Aug. 16, the date of the merger of Alum Steel Co. and Allegheny Steel Co.

—Dividend of 1/75 share of preferred stock paid on common stock, no cash dividends.

12—After preferred requirements totaling \$1,996,860.

13—Based on 20 companies reporting both net sales and net incomes.

14—After preferred requirements totaling \$53,312,286.

15—Based on results of 11 companies reporting ingot production and one reporting shipments.

Operations of 21 steel companies in 1937 and 22 in 1938, representing, in the latter year, 93 per cent
of the United States. All values are as of Dec. 31, unless otherwise noted. Red indicates loss.

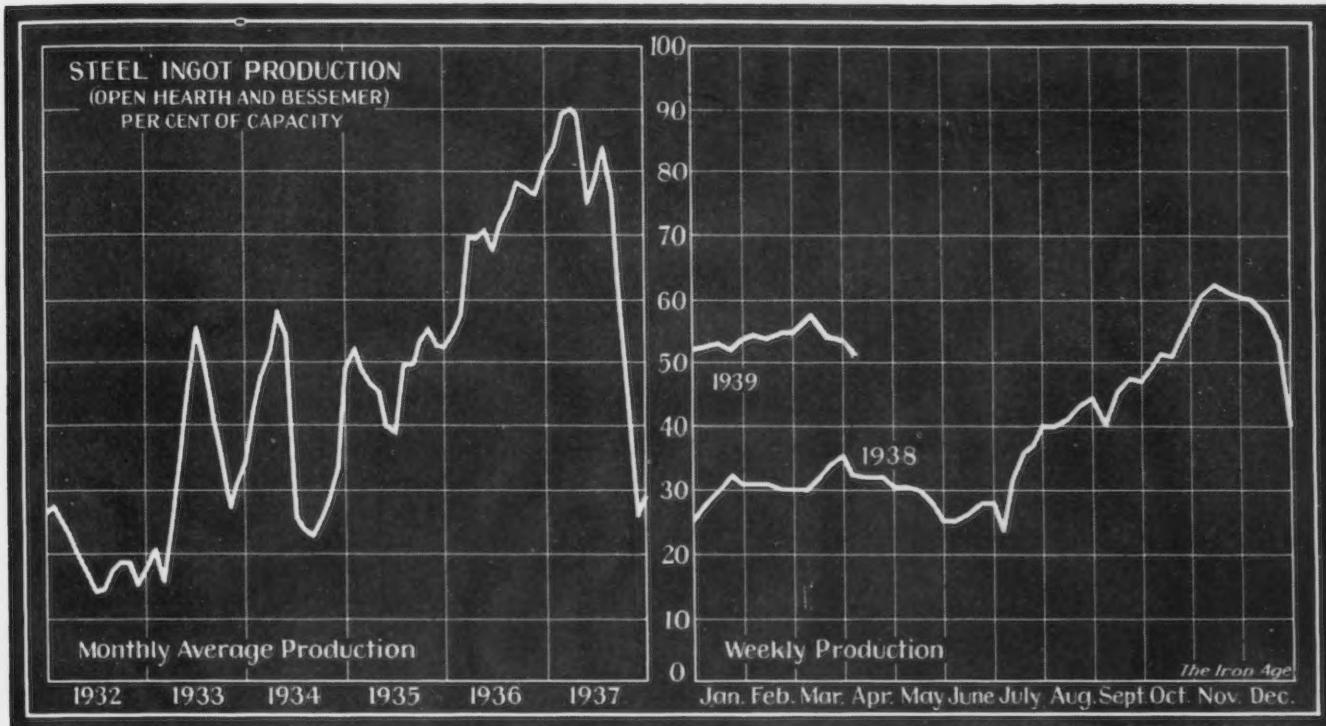
	Total Invested Capital (000 omitted)	Earnings on Invested Capital ¹	Per Cent Return on Invested Capital	Capitalization Per Ton of Ingots Capacity	Common Share Dividends Paid	Preferred Share Dividends Paid	NAME OF COMPANY	
32	\$1,542,619	\$544,874	0.04	\$59.81		\$25,219,677	1938	United States Steel Corp.
36	1,712,784	100,152,535	5.9	66.10	\$8,703,252	58,545,679	1937	
33	654,535	12,377,847	1.9	65.18		7,471,096	1938	Bethlehem Steel Corp.
39	666,474	38,786,013	6.0	66.37	15,941,020	7,471,096	1937	
11	320,500	3,670,068	1.1	49.31		423,455	1938	Republic Steel Corp.
22	332,551	14,002,284	4.2	51.53		3,846,567	1937	
00	210,595	3,821,747	1.8	57.36			1938	Jones & Laughlin Steel Corp.
04	200,733	6,330,951	3.2	54.68		3,082,480	1937	
00	189,107	8,987,618	4.8	55.62	2,168,532		1938	National Steel Corp.
33	179,685	20,231,364	11.3	52.85	7,584,519		1937	
19	227,876	2,249,944	1.0	73.04		825,000	1938	Youngstown Sheet & Tube Co.
34	199,534	14,906,569	7.5	63.95	5,204,004	2,268,750	1937	
33	128,932	1,200,996	0.9	48.73		1,012,523	1938	American Rolling Mill Co.
24	133,021	9,242,941	6.9	52.14	4,015,944	972,351	1937	
98	143,363	6,788,710	4.7	51.94	3,940,693		1938	Inland Steel Co.
52	143,364	14,673,397	10.2	61.27	7,682,375		1937	
53	109,964	2,006,160	1.8	62.84		1,317,732	1938	Wheeling Steel Corp.
60	111,074	5,774,213	5.2	63.47		1,923,112	1937	
99	34,463	53,453	0.2	34.81			1938	
73	34,422	1,984,434	5.8	38.76			1937	Colorado Fuel & Iron Corp. ³
45	34,244	557,785	1.6	39.27		397,218	1938	Otis Steel Co.
08	36,017	3,099,491	8.7	41.30		917,495	1937	
42	40,109	370,912	0.9	49.55			1938	Pittsburgh Steel Co.
20	38,351	1,859,198	4.8	47.38			1937	
53	10,560	80,514	0.8	16.56			1938	Lukens Steel Co. ⁴
12	10,873	329,333	3.0	17.05			1937	
38	15,577	95,325	0.6	31.15		298,600	1938	Sharon Steel Corp.
21	15,691	1,409,741	9.0	31.38		249,287	1937	
20	11,504	330,231	2.9	31.96	47,808		1938	Granite City Steel Co.
98	11,882	254,225	2.1	33.00	430,296		1937	
21	13,155	687,306	5.2	40.48	200,561	168,121	1938	Continental Steel Corp.
60	12,969	871,509	6.7	46.32	300,866	173,139	1937	
92	5,917	.331,849	5.6	23.77	257,813		1938	Laclede Steel Co.
18	5,843	455,729	7.8	23.47	412,500		1937	
19	\$3,693,020	\$26,855,731	0.7%	\$57.32 ⁹	\$6,615,407	\$37,133,422		Summary, 1938
								Special Steel Producers
11	106,261	1,791,219	1.7	124.52		417,900	1938	Crucible Steel Company of America
93	103,843	4,384,415	4.2	107.79		2,149,200	1937	
20	26,017	1,070,186	4.1	50.44 ¹⁰		233,480	1938	Allegheny Ludlum Steel Corp.
91	12,366	1,244,210	9.9	45.29	998,720		1938	Midvale Co.
63	12,038	1,341,816	11.1	44.09	1,198,426		1937	
97	5,719	213,128	3.7	142.97	392,848		1938	Vanadium-Alloys Steel Co. ²
57	5,938	968,693	16.3	148.44	938,800		1937	
99	3,169	81,110	2.6	70.41		91,292	1938	Rustless Iron & Steel Corp.
04	3,156	713,139	22.6	90.18	11	44,446	1937	
28	\$153,532	\$2,259,481	1.5%	\$88.42 ⁹	\$1,391,568	\$742,672		Summary, Special Steel Producers, 1938
47	\$3,846,552	\$29,115,212	0.8%	\$58.13 ⁹	\$8,006,975	\$37,876,094		SUMMARY, ALL PRODUCERS, 1938

THE IRON AGE, APRIL 13, 1939



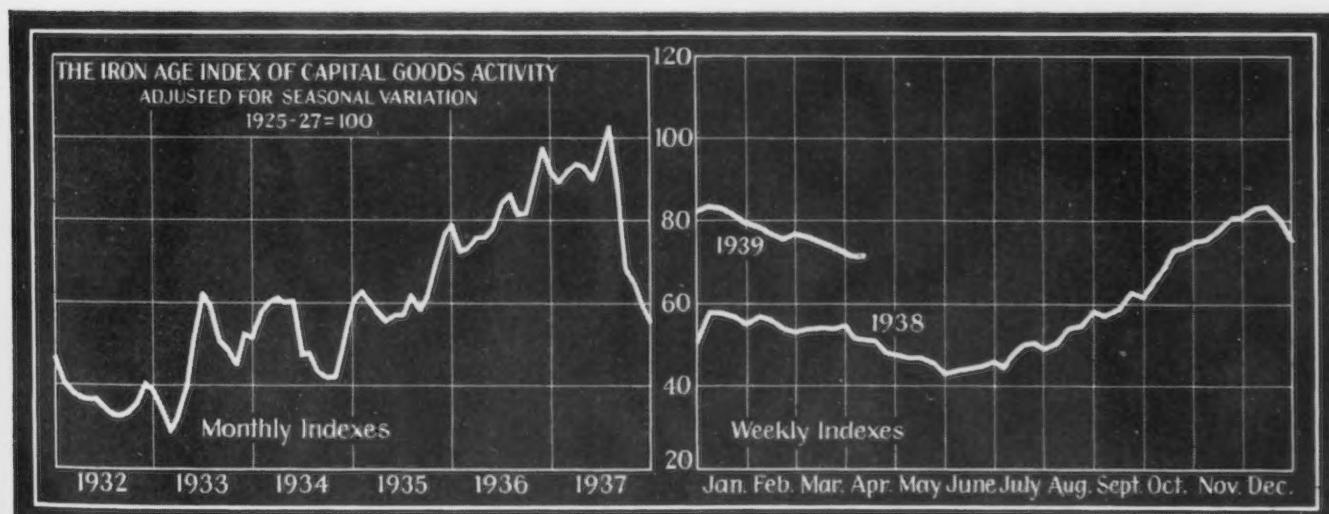


Ingot Output Declines Three Points to 51½%



District Ingot Production, Per Cent of Capacity	Pittsburgh	Chicago	Philadelphia	Cleveland	Buffalo	Wheeling	Detroit	Southern	S. Ohio River	Western	St. Louis	Eastern	Aggregate
CURRENT WEEK..	45.0	53.5	46.0	36.0	37.0	47.0	76.0	55.0	46.5	55.5	60.0	46.5	50.0
PREVIOUS WEEK..	46.0	53.5	52.0	38.0	53.0	41.5	76.0	73.0	50.5	55.5	60.0	43.0	55.5

Fifth Consecutive Decline Brings Index Down to 71.2



DECLINING for the fifth consecutive week, THE IRON AGE index of capital goods activity stood at 71.2 at the end of the past week, a loss of 0.9 point from the previous week and the lowest index position since the week of Oct. 15, 1938. The heaviest loss for the week was recorded by the construction series. Although the physical volume of construction contracts placed in the past week was higher than in the preceding week, the 13-week average used in computing this series continues to move downward as current awards fail to equal the heavy volume of the first few weeks of the year. The automobile series also lost ground, as production failed to improve in keeping with the seasonal trend. The average combined index

for March is 74.1, as compared with 77.3 in the preceding month and 53.7 in March, 1938.

	Week Ended Apr. 8	Week Ended Apr. 1	Comparable Week
Steel ingot production ¹	70.0	71.0	41.7 122.2
Automobile production ²	74.9	76.3	51.1 126.2
Construction contracts ³	86.6	90.1	71.1 149.8
Forest products carloadings ⁴ .	51.0	50.9	42.6 131.9
Production and shipments, Pittsburgh District ⁵	73.3	72.3	51.9 117.7
Combined index	71.2	72.1	51.7 129.6

Sources: 1. THE IRON AGE; 2. Ward's Automotive Reports; 3. Engineering News-Record; 4. Association of American Railroads; 5. University of Pittsburgh.

... SUMMARY OF THE WEEK ...

... Production of steel and pig iron reduced.

... Scrap prices lower in some districts; composite down.

... Pig line taking upward of 33,000 tons placed, also 1050 cars.

ALL of the important indices of steel activity are lower this week. Orders have declined, ingot output is three points lower at 51½ per cent, pig iron production is being reduced proportionately and scrap prices, with some exceptions, are down from 50c. to \$1 a ton.

The volume of incoming business has not dropped drastically, but a spirit of caution and hesitation is evident among buyers, with the result that the orders are of the hand-to-mouth variety—small and for immediate shipment. Only in tin plate is the trend of buying slightly upward, while the construction steels—shapes, reinforcing bars and piling in particular—are holding approximately to recent levels.

The decline in steel production, however, has been sharper in some districts than the three-point drop in the national average would indicate. In the Cleveland-Lorain district, for example, the rate has fallen 16 points to 37 per cent; in the Detroit district, where one mill has taken off four open hearths this week, the rate has dropped from 73 per cent to 55 per cent; the Pittsburgh district is three points lower at 45 per cent; Youngstown is down six points, Birmingham four points and Eastern Pennsylvania two points. Only at Buffalo and St. Louis have there been moderate increases, though the Wheeling-Weirton district, at 76 per cent, and the Chicago district, at 53½ per cent, are unchanged.

Blast furnace output is tapering off. While there has been no sharp reduction in active furnaces, those that are in blast are for the most part on reduced blast and turning out less iron.

Some of the scrap markets have weakened to a marked degree. At Youngstown prices on steel grades are \$1 a ton lower, while 50c. reductions have gone into effect in Chicago, Cleveland, Detroit, St. Louis and Cincinnati. At Pittsburgh there is no change principally because of the fact that there is no overabundance of No. 1 heavy melting steel in the immediate neighborhood. Philadelphia prices are steady because of export purchases. The International Scrap Convention has placed additional orders totaling about 100,000 tons at \$15 for No. 1 steel, but paid \$16.75 for

railroad steel scrap. THE IRON AGE scrap composite price has declined 17c. to \$15.08.

WHILE most of the restrained optimism which prevailed in the steel industry a month ago has vanished, there is, on the other hand, no disposition to accept the current slump as the beginning of a protracted or sharp decline. Buyers are protecting themselves against possible contingencies by keeping inventories extremely low, and this fact warrants an expectation of resumption of normal buying if the European situation is resolved without resort to war.

In the event of war in Europe, it is considered likely that foreign shipments would increase sharply within a few months provided the Neutrality Act is amended to permit the shipment of supplies on a cash and carry basis to all belligerents. However, there is no belief either in the steel industry or in Washington that a European war would swell business to boom proportions within the immediate future.

Notwithstanding the downward trend in steel orders generally, there have been a few bright spots in the market, notably the placing of a pipe line order totaling 33,000 to 36,000 tons by the Socony Vacuum Oil Co. for a line to be laid from Wood River, Ill., to Lima, Ohio. The order was shared by National Tube Co. and Republic Steel Corp. There was also some additional railroad buying of importance, the Missouri Pacific having ordered 1050 steel freight cars from the Mount Vernon Car Mfg. Co., also two streamlined aluminum trains of six cars each and six diesel locomotives. The Wabash ordered four diesel locomotives.

ALTHOUGH automobile assemblies made a slight gain last week, there has been curtailment in the manufacture of parts, indicating the care with which the automobile manufacturers are watching the current situation. Dealers are fairly well stocked and the trend of new car assemblies during the remainder of this month will be governed largely by the volume of retail sales. No large steel purchases for completion of runs on 1939 models are expected, but steel for 1940 models will be bought possibly in May.

Structural steel business has been in fair volume, totaling about 24,000 tons, with about 18,000 tons of new projects in the market. Largest structural steel lettings were 6000 tons for a section of the Delaware Aqueduct, Ulster County, N. Y.; 4370 tons for TVA transmission towers, 4210 tons for a vocational school in Chicago and 1475 tons for a Potomac River bridge. The new projects include 6000 tons for towers for Shasta Dam in California, 2000 tons for grade crossings near Sacramento, Cal., 1400 tons for a tunnel in Mobile, Ala., and 1200 tons for an addition to a Brooklyn school.

A Comparison of Prices

Market Prices at Date, and One Week, One Month, and One Year Previous
Advances Over Past Week in Heavy Type, Declines in Italics

Rails and Semi-finished Steel

	Apr. 11, 1939	Apr. 4, 1939	Mar. 14, 1939	Apr. 12, 1938
Per Gross Ton:				
Rails, heavy, at mill	\$40.00	\$40.00	\$40.00	\$42.50
Light rails: Pittsburgh, Chicago, Birmingham	40.00	40.00	40.00	43.00
Reroiling billets: Pittsburgh, Chicago, Gary, Cleveland, Youngstown, Buffalo, Birmingham, Sparrows Point	34.00	34.00	34.00	37.00
Sheet bars: Pittsburgh, Chicago, Cleveland, Youngstown, Buffalo, Canton, Sparrows Point	34.00	34.00	34.00	37.00
Slabs: Pittsburgh, Chicago, Gary, Cleveland, Youngstown, Buffalo, Birmingham, Sparrows Point	34.00	34.00	34.00	37.00
Forging billets: Pittsburgh, Chicago, Gary, Cleveland, Youngstown, Buffalo, Birmingham	40.00	40.00	40.00	43.00
Wire rods: Nos. 4 and 5, Pittsburgh, Chicago, Cleveland	43.00	43.00	43.00	47.00
Skelp, grvd. steel: Pittsburgh, Chicago, Youngstown, Coatesville, Sparrows Point, cents per lb.	1.90	1.90	1.90	2.10

Finished Steel

Cents Per Lb.:				
Bars: Pittsburgh, Chicago, Gary, Cleveland, Buffalo, Birmingham	2.25	2.25	2.25	2.45
Plates: Pittsburgh, Chicago, Gary, Birmingham, Sparrows Point, Cleveland, Youngstown, Coatesville, Clayton	2.10	2.10	2.10	2.25
Structural shapes: Pittsburgh, Chicago, Gary, Buffalo, Bethlehem, Birmingham	2.10	2.10	2.10	2.25
Cold finished bars: Pittsburgh, Buffalo, Cleveland, Chicago, Gary	2.70	2.70	2.70	2.90
Alloy bars: Pittsburgh, Chicago, Buffalo, Bethlehem, Massillon or Canton	2.80	2.80	2.80	3.00
Hot rolled strip: Pittsburgh, Chicago, Gary, Cleveland, Middletown, Youngstown, Birmingham	2.15	2.15	2.15	2.40
Cold rolled strip: Pittsburgh, Cleveland, Youngstown	2.95	2.95	2.95	3.20
Sheets, galv., No. 24: Pittsburgh, Gary, Sparrows Point, Buffalo, Middletown, Youngstown, Birmingham	3.50	3.50	3.50	3.80
Hot rolled sheets: Pittsburgh, Gary, Birmingham, Buffalo, Sparrows Point, Cleveland, Youngstown, Middletown	2.15	2.15	2.15	—
Cold rolled sheets: Pittsburgh, Gary, Buffalo, Youngstown, Cleveland, Middletown	3.20	3.20	3.20	—

On export business there are frequent variations from the above prices. Also in domestic business, there is at times a range of prices on various products, as shown in our detailed price tables.

The Iron Age Composite Prices

Finished Steel

	2.286c. a Lb.
April 11, 1939	2.286
One week ago	2.286
One month ago	2.286
One year ago	2.512

Based on steel bars, beams, tank plates, wire, rails, black pipe, sheets and hot-rolled strip. These products represent 85 per cent of the United States output.

	HIGH	LOW
1939	2.512c., May 17; 2.211c., Oct. 18	\$23.25, June 21; \$19.61, July 6
1938	2.512c., Mar. 9; 2.249c., Jan. 4	23.25, Mar. 9; 20.25, Feb. 16
1937	2.249c., Dec. 28; 2.016c., Mar. 10	19.73, Nov. 24; 18.73, Aug. 11
1936	2.062c., Oct. 1; 2.056c., Jan. 8	18.84, Nov. 5; 17.83, May 14
1935	2.118c., Apr. 24; 1.945c., Jan. 2	17.90, May 1; 16.90, Jan. 27
1934	1.953c., Oct. 3; 1.792c., May 2	16.90, Dec. 5; 13.56, Jan. 3
1933	1.915c., Sept. 6; 1.870c., Mar. 15	14.81, Jan. 5; 13.56, Dec. 6
1932	1.981c., Jan. 13; 1.883c., Dec. 29	15.90, Jan. 6; 14.79, Dec. 15
1931	2.192c., Jan. 7; 1.962c., Dec. 9	18.21, Jan. 7; 15.90, Dec. 16
1930	2.223c., Apr. 2; 2.192c., Oct. 29	18.71, May 14; 18.21, Dec. 17
1929	2.192c., Dec. 11; 2.142c., July 10	18.59, Nov. 27; 17.04, July 24

Pig Iron

\$20.61 a Gross Ton
20.61
20.61
23.25

Based on average for basic iron at Valley furnace and foundry iron at Chicago, Philadelphia, Buffalo, Valley and Southern iron at Cincinnati.

Steel Scrap

\$15.08 a Gross Ton
15.25
15.17
12.58

Based on No. 1 heavy melting steel quotations at Pittsburgh, Philadelphia and Chicago.

HIGH

LOW

\$15.29, Mar. 28;	\$14.875, Jan. 31
15.00, Nov. 22;	11.00, June 7
21.92, Mar. 30;	12.92, Nov. 10
17.75, Dec. 21;	12.67, June 9
13.42, Dec. 10;	10.33, Apr. 29
13.00, Mar. 13;	9.50, Sept. 25
12.25, Aug. 8;	6.75, Jan. 3
8.50, Jan. 12;	6.43, July 5
11.33, Jan. 6;	8.50, Dec. 29
15.00, Feb. 18;	11.25, Dec. 9
17.58, Jan. 29;	14.08, Dec. 3
16.50, Dec. 31;	13.08, July 9

. . THIS WEEK'S MARKET NEWS . .

STEEL OPERATIONS

. . Ingot rate drops sharply to 51½% of industry's capacity

INGOT production has dropped sharply to 51½ per cent of the industry's capacity, a loss of three points from last week, pig iron output is being lowered and mill operations in some departments, particularly sheets and strip, are intermittent.

The loss in steel operations in some districts is greater than is indicated by the drop of three points for the entire industry. In the CLEVELAND-LORAIN district there has been a decline of 16 points to 37 per cent; the DETROIT district, where the Great Lakes Steel Corp. has taken off four open hearths, has dropped from 73 per cent to 55 per cent; the PITTSBURGH district is three points lower at 45 per cent; the YOUNGSTOWN district is six points lower at 46 per cent; the BIRMINGHAM district is four points off at 46½ per cent, and EASTERN PENNSYLVANIA is two points lower at 36 per cent.

Only the BUFFALO and ST. LOUIS districts show gains. BUFFALO is up to 47 per cent and ST. LOUIS has gained slightly to 46½ per cent. The WHEELING-WEIRTON district is outstanding in operations, remaining at 76 per cent. CHICAGO is unchanged at 53½ per cent.

NEW BUSINESS

. . Orders are declining, but only moderately . . . Buying is hand-to-mouth

NEW business at PITTSBURGH continues approximately at the levels of the past two weeks. Producers there look for no sharp decline in the rate of incoming business since consumers are on a strictly hand-to-mouth basis and inventories are low. The PITTSBURGH district has been benefiting from the fairly steady flow of structural, rail and tin plate specifications and it is this condition which precludes drastic curtailment of either production or the volume of bookings. However, despite the fact that sales and production data disclose no alarming situation, sentiment in the steel industry has been adversely affected by foreign and domestic news and has apparently resulted in even a greater-

than-ever caution on the part of steel buyers.

Though new orders in the CHICAGO district do not seem to be appreciably lower in volume, a slight decline from week to week has been reported and a decided lack of optimism is apparent. Nowhere in the picture can steel men in the Midwest see tonnages of sufficient size to increase or even sustain current operating rates. A large decline from present rates is not looked for, however.

Some buying for 1940 automobiles is expected next month but little is looked for until then from that industry.

The Missouri Pacific 1250 car order placed with the Mount Vernon Car Co. is the largest in some time and several similar building programs are expected in the second and third quarters.

The Santa Fe rail program may amount to over 50,000 tons and will probably be the last major rail purchase this spring.

A number of factors are exerting a bolstering influence at YOUNGSTOWN and CLEVELAND. Large new orders for line pipe, the heaviest business received in some time, will greatly assist tubular production of two companies. Construction continues to provide major support, and the container industry is more active. A number of rail proposals, including the Erie inquiry for 10,000 tons to 15,000 tons, are progressing. Pig iron shipments show only a small variation so far this month from the comparable March period.

Against the above developments, the automobile and agricultural implement industries are yielding only small orders, indicating the approach of the "wind up" stage. Farm demand for roofing sheets, fence and nails is seasonally active, but jobbers bought so heavily early this year that reflection in orders to mills is lighter than usual.

In the ST. LOUIS area business the past week was the lightest in several months. Consumers are hesitant about making commitments for any materials which are not required for orders in hand. Unsettled conditions here and abroad are blamed for the lack of business.

New business is definitely slowed on the Pacific Coast in all lines. With the exception of Federal buildings in San Francisco and Seattle, no large concrete or structural steel projects

are outstanding. Awards in both divisions were extremely light during the week.

Sentiment in NEW YORK is sharply affected by the developments abroad and in the stock market. In fact sentiment has been worse than business in the past week. Orders were reduced from recent levels, but were in fair volume, though tin plate and construction steel bolstered the aggregate tonnages.

PRICES

. . No substantial test as yet of revisions of extras

WITH individual orders not large, there has as yet been no substantial test of second quarter price extras and deductions. Base prices are fairly firm but have not been tested by large purchases recently.

A competitive situation among steel jobbers in PITTSBURGH has resulted in concessions of \$3 to \$5 a ton on some of the major products sold by warehouses.

The base price to jobbers on 16-mesh galvanized wire cloth has been changed from \$2.50, less 20 per cent, per 100 lb. to \$5, less 50 and 10 per cent. Net price remains the same, but the higher base gives greater flexibility in future adjustments in discounts.

Fresh weakness has appeared in reinforcing bars in NEW YORK, where efforts to strengthen quotations have not been successful.

PIG IRON

. . Melters are cautious in buying . . . Market shows no trend

PIG iron sales and shipments show no pronounced trend. April shipments are at about the March rate. While there is no improvement, neither is there any pronounced falling off. However, melters are buying cautiously, hesitating to build up inventories in the face of existing uncertainty.

In the ST. LOUIS area there has been a slight pickup in sales owing to an increase in operations among stove foundries, jobbing plants and foundries catering to the agricultural machinery trade.

Elsewhere, however, there is very little change.

SEMI-FINISHED STEEL

... Non-integrated mills buying hand-to-mouth

TOTAL orders at PITTSBURGH reflect little difference from a week ago. Major movement involves tin bars to non-integrated mills, while the poor showing in sheet and strip sales has curtailed sheet bar specifications. Buying continues on a hand-to-mouth basis.

Shipments, orders and inquiries continue relatively poor at CLEVELAND. Non-integrated producers are buying strictly on a hand-to-mouth basis, a condition which is expected to continue indefinitely.

REINFORCING BARS

... Volume is fairly good ... Weather delays some projects

A FAIRLY good volume of reinforcing bar tonnages has been coming along and more is in sight. At CHICAGO cold and rainy weather has held up many projects that were scheduled to go ahead this spring. A large amount of pending work remains on the books, including about 5000 tons for two sections of the subway.

A viaduct at Kansas City, Mo., for which bids are asked April 15, will require 585 tons. An unstated tonnage is required for highway work in Missouri and Illinois. Bids will be taken in Missouri on April 21 and in Illinois on April 14.

Opening of general contract bids for the SAN FRANCISCO Rincon Hill post office and the Seattle court house this month should bring about 3000 tons on the Pacific Coast market. Otherwise business in that region is quiet.

Bids will be opened April 21 at the office of the General Purchasing Officer for 500 tons of concrete reinforcement bars for delivery at Cristobal or Balboa.

On April 20 the Bureau of Supplies and Accounts, Navy Department, will open bids for 150 tons of steel bars, 225 tons of shapes and angles and 78 tons of special shapes for three submarines building at the Portsmouth, N. H., and the Mare Island, Cal., Navy yards.

Prices in the New York area are rather weak, the present going price being in the neighborhood of 1.90c. per lb., delivered, representing about 1.61c. per lb. at Sparrows Point, the basing point for the NEW YORK district.

Market Sidelights

The proposed bridge from Battery Park, New York, to Hamilton Avenue, Brooklyn, will require, according to city engineers, 50,000 tons of shapes, 25,000 tons of cables, 500 tons of reinforcing bars and large quantities of cast iron and cast steel. The bridge, which will be built by the Triborough Bridge Authority, has not as yet been approved by Army engineers.

* * *

Bethlehem Steel Co. officials have officially announced that they intend to enter bids for two destroyers to be built at San Francisco at the earliest opportunity. This move is to combat a San Francisco campaign to have the Federal Government acquire Bethlehem shipbuilding facilities there.

* * *

Two contracts for the new \$2,000,000 county hospital at Birmingham have been awarded. Rust Engineering Co. received the contract for the foundations on a bid of \$90,308. The steel contract was awarded to the Steel Construction Co., on a bid of \$257,468.

* * *

The coal mining holiday continues, but has not yet affected iron and steel operations, because of stocks on hand.

SHEETS AND STRIP

... Trend of orders downward ... Outlook uncertain

CURRENT sheet and strip business at PITTSBURGH is exceedingly disappointing to producers and the leveling off in automotive business has complicated market conditions further. Orders are fairly well distributed but involve excessive handling costs because of the small tonnages involved. Little or no major testing of the recently revised quantity deduction policy has occurred since the first of the month. Flat and formed galvanized sheet sales have dropped off precipitously since the first of the month as most buyers covered before functional discounts were eliminated at the beginning of the quarter.

Incoming tonnage at CLEVELAND and YOUNGSTOWN has tended downward slightly during the past few days. Some of the larger consumers apparently have little more than "wind up" releases to offer since their operations are tapering. Quite a number of miscellaneous consumers continue active and expect to maintain operations well into the summer.

CHICAGO mills are receiving only small orders for automobile steel and do not look for large purchases until production on 1940 cars is started. It is believed here that the major motor car manufacturers still have sufficient low priced sheets on hand to finish out this month. Miscellaneous demand is holding up fairly well but prospects for much improvement over the remainder of this month are few.

Sheet sales in NEW YORK in the past week have been spotty, some sellers reporting a gain in activity over the previous week, others a decline. Generally a feeling of uncertainty over future trends prevails.

Bookings of PHILADELPHIA sales offices continue to contract in a moderate way, the total volume so far in April being at least 15 per cent under the March average. Local autobody stamping plants continue to turn out a moderate amount of parts for 1939 automobiles, but it is generally conceded that activity in that direction will taper off.

MERCHANT BARS

... Orders are steady to slightly poorer

BAR sales at PITTSBURGH, although not spectacular, continue steady with further evidence of increased diversification. The falling off in business from automobile interests has shifted support for the bar market to miscellaneous sources.

Orders at CLEVELAND are running slightly behind the comparable March period. Demand from the agricultural implement industry appears to be tapering, leaving the machinery field as the outstanding consumer.

Hand-to-mouth buying continues the rule in CHICAGO with the most active buyers the tractor makers, miscellaneous sources and jobbers.

STRUCTURAL STEEL

... Awards are about 24,000 tons; pending list 17,500 tons

STRUCTURAL steel lettings are in fair volume this week at about 24,000 tons, while 17,500 tons of new work came into the market for bids.

Outstanding awards were 6000 tons for a section of the Delaware aqueduct, which went to the Carnegie-Illinois Steel Corp.; 4210 tons for a vocational school in CHICAGO to the Duffin Iron Works, and 4370 tons for trans-

mission towers for the TVA to the American Bridge Co.

Among the new projects are 6000 tons for towers for the Shasta Dam in California, 2000 tons for Bureau of Reclamation grade crossing elimination work at Sacramento, Cal., 1400 tons for a vehicular tunnel in Mobile, Ala., and 1200 tons for a residence hall at a Brooklyn school.

Plans are out for the 15th Street viaduct in Kansas City, Mo., requiring 3500 tons of structural shapes and 495 tons of welded trusses, on which bids are due April 15.

PLATES

Concession of \$2 a ton bid by one mill to railroad

A BID of \$2 a ton under the market was made on the quarterly requirements of the New York Central by one of the smaller Eastern independents which ordinarily does not share in this road's business because of being off the line. Other mills quoted the going market prices.

Plate business continues to be relatively poor, but is occasionally marked by tonnages of unusual size. Bids were received April 12 on one such job—three sections of the Toledo, Ohio, municipal pipe line. These sections will take 10,000 tons of plates.

Some small lots of plates for oil refinery work were placed in NEW YORK in the past week.

Orders booked by Eastern mills in March were 10 to 15 per cent below those of February.

WIRE PRODUCTS

Sales lower . . . Automobile industry's releases slow

TOTAL wire sales at PITTSBURGH, if anything, were, during the past week, in slightly less volume than in the previous week. Foreign news and static general business conditions have caused many consumers to adopt a cautious attitude on purchases.

At CLEVELAND operations are holding up well and aggregate incoming tonnage shows only a slight downward trend from last week. The anticipated second quarter increase, however, appears unlikely to materialize to the extent expected. Merchant wire products are moving a little faster for producers, while jobbers are very active in the farm areas. The automotive in-

dustry has been slow to make releases for manufacturers' wire recently.

March bookings in CHICAGO were about equal to those of February, but an increase is expected this month with an improvement in weather conditions. A seasonal upturn in sales of merchant wire products is anticipated, while better business in manufacturing products depends to a great extent on the automobile industry.

BOLTS, NUTS, RIVETS

Little change noted from week to week

EXCEPT for minor variations, very little change has been shown from week to week recently in the bolt and nut market. While there is little fear of an extensive drop, on the other hand indications of large gains are lacking. Rivet manufacturers who have shown successive monthly gains since last October, due to diversified orders, report the last two weeks have been quieter than usual.

WAREHOUSE BUSINESS

Jobbers' prices at Pittsburgh Shaded \$3 to \$5 a ton

WAREHOUSE prices at PITTSBURGH on hot rolled material including soft steel bars, reinforcing bars, plates, shapes and flat rolled products are highly unsettled with concessions having been made at from \$3 to \$5 a ton off the base prices. The situation is more or less of a local matter and leading warehouse interests insist that no changes have been made in published prices. Early clarification is expected. Meanwhile, published prices on hot rolled items are considered to be nominal.

TUBULAR GOODS

Pipe line taking upward of 30,000 tons is placed

THE Socony Vacuum Oil Co., 26 Broadway, New York, has placed orders for 360 miles of pipe through its subsidiary, the Magnolia Petroleum Co., of Dallas, Tex., which will have charge of construction of the line, which will be built from Wood River, Ill., to Lima, Ohio. A portion of the order will supplement existing pipe lines to the company's refineries at Trenton, Mich., and Buf-

falo, N. Y. The total amount of 10-in. pipe involved in the order is estimated at 33,000 to 36,000 tons, which will be furnished by the National Tube Co. and the Republic Steel Corp.

Tubular goods sales other than the line mentioned are virtually unchanged from recent levels.

RAILROAD BUYING

Missouri Pacific places orders for freight and passenger cars

THE outstanding railroad orders of the week were placed by the Missouri Pacific, which ordered 1025 50-ton gondola cars and 25 steel-sheathed box cars from the Mount Vernon Car Mfg. Co. These cars will take about 15,000 tons of steel. Missouri Pacific also purchased two streamlined trains of six cars each, to be built of aluminum, from the American Car & Foundry Co., two 900 hp., two 600 hp. diesel switching locomotives from the Electro Motive Corp., and two 1000 hp. diesel switching locomotives, one each from the American Locomotive Co. and the Baldwin Locomotive Works.

The Wabash has ordered three diesel switching locomotives of 600 hp. from the Electro Motive Corp., and one of 600 hp. from the American Locomotive Co.

United Carbon Co. has placed an order for 10 covered hopper cars with American Car & Foundry Co.

Railroad equipment manufacturers received orders for 63 locomotives, 1000 freight cars and 60 passenger-train cars in March, as compared with three locomotives, 2007 freight cars and no passenger-train cars in February, according to *Railway Age*. Cumulative totals for the first three months of the current year are 74 locomotives, 3007 freight cars and 107 passenger-train cars against 36 locomotives, 816 freight cars and 51 passenger-train cars in the corresponding period of 1938. Canadian roads ordered 2075 freight cars and 15 passenger-train cars in March, some of which will be built in railroad shops and some by Canadian builders.

The a.c.f. Motor Co. has received orders for 31 motor coaches powered with the Hall-Scott horizontal engine as follows: 12 for Aronimink Transportation Co., Upper Darby, Pa.; four for Georgia Power Co., Atlanta, Ga.; three for Jamaica Buses, Inc., Jamaica, N. Y.; two for Quaker City Bus Company, Inc., Ocean City, N. J.; two for Safeway Trails, Inc., New York;

two for Southern Kansas Greyhound Lines, Inc., Kansas City, Mo.; two for Saugus Transit Co., Saugus, Mass.; one for Williamsport Transportation Co., Williamsport, Pa.; one for Plymouth & Brockton Street Railway Co., Plymouth, Mass.; one for S. T. Bus Co., Bayonne, N. J., and one for Scranton Transit Co., Scranton, Pa.

TIN PLATE

... Operations continue at 60 per cent, orders better

TIN plate operations this week are estimated at 60 per cent, unchanged from the past two weeks. Large sanitary can makers have begun to loosen up with new commitments and there has been a further increase in miscellaneous business. Producers continue highly optimistic with regard to new business during the next few months.

Orders placed at NEW YORK in the past week by one company have been the largest in some time.

U. S. to Survey Harbor Near National Steel Mill Site

CHICAGO—The National Steel Corp. apparently is assured of a harbor for its proposed Mid-West steel plant near Valparaiso, Ind., according to the report that the War Department has ordered army engineers to prepare a detailed survey of Burns Ditch so that recommendations for immediate construction of the harbor may be made to Congress. The survey was ordered as a result of the Indiana legislature's recent action in creating a Board of Harbors and Terminals and granting a subsidy of \$50,000 to launch the Burns Ditch Harbor project. National is expected to begin construction late this year or in 1940.

REINFORCING STEEL

... Awards of 4800 tons; 4100 tons in new projects.

ATLANTIC STATES AWARDS

- 435 Tons, Queens, N. Y., sewer project, Southern Parkway, to Igoe Bros., Newark, through P. Tomasetti Contracting Corp., Brooklyn.
- 380 Tons, Springfield, Mass., Connecticut River flood wall, to Concrete Steel Co., Boston.
- 300 Tons, Narrows, Va., six buildings for Celanese Corp. of America, to Bethlehem Steel Co., Bethlehem, Pa.
- 150 Tons, Cambridge, Mass., high school addition, to Concrete Steel Co., Boston, through Rugo Construction Co., contractor.
- 140 Tons, York, Pa., dam, to Bethlehem Steel Co., Bethlehem, Pa.
- 125 Tons, North Adams-Williamstown, Mass., State road, to Truscon Steel Co., Boston, through Central Construction Co., Lawrence, Mass., contractor.
- 100 Tons, Philadelphia, Coca-Cola plant, changed from structural steel to reinforced concrete and awarded to Concrete Steel Co., New York.

CENTRAL AND WESTERN STATES

- 390 Tons, Sunol, Cal., Calaveras Dam spilling basin, to Soule Steel Co., San Francisco, through Eaton & Smith, San Francisco, contractors.
- 338 Tons, Rock Island, Ill., substructure for Mississippi River bridge to Inland Steel Co., Chicago.
- 280 Tons, Lorain, Ohio, East 21st Street bridge, to Carnegie-Illinois Steel Corp., Pittsburgh, through Great Lakes Dredge & Dock Co., Cleveland.
- 240 Tons, Lancaster, Ohio, sewage disposal plant, to Pollak Steel Co., Cincinnati.
- 236 Tons, South Bend, Ind., East Side Junior High School, to Coco Steel Products Co., Chicago.
- 230 Tons, Lorain, Ohio, Erie Avenue bridge, to Carnegie-Illinois Steel Corp., Pittsburgh, through Great Lakes Dredge & Dock Co., Cleveland.
- 220 Tons, St. Louis, Banneker School, to Sheffield Steel Corp., Kansas City, Mo., through Kellerman Contracting Co.
- 200 Tons, W. Lafayette, Ind., music hall, Purdue University, to Republic Steel Corp., Cleveland, through Truscon Steel Co.
- 200 Tons, Emporia, Kan., municipal building, to Missouri Rolling Mill Corp., St. Louis.
- 170 Tons, Peru, Ind., sewage plant, to Republic Steel Corp., Cleveland.
- 158 Tons, San Francisco, Marina Junior High School auditorium, to W. C. Hauck & Co., San Francisco through Monson Brothers, San Francisco, contractors.
- 150 Tons, Peru, Ill., Century Distilling Co. building to Bethlehem Steel Co., Bethlehem, Pa.

134 Tons, Cody, Wyo., Shoshone project (Invitation 48188-A), to Colorado Fuel & Iron Corp., Denver.

101 Tons, Cody, Wyo., Shoshone project (Invitation 48189-A), to Bethlehem Steel Co.

100 Tons, Chicago, S. Damen Avenue bridge, to Concrete Steel Co., Chicago.

PENDING REINFORCING BAR PROJECTS

ATLANTIC STATES

- 400 Tons, Queens, N. Y., sewer project, contract No. 4.
- 328 Tons, Putnam County, N. Y., mostly mesh, highway project E.S.P. 39-1; A. E. Ottaviano, Inc., Croton-on-Hudson, N. Y., low bidder. (Previously reported.)
- 223 Tons, Westmoreland County, Pa., section 4A, Pennsylvania turnpike commission.
- 208 Tons, Fulton County, Pa., sections 16A and 17A, Pennsylvania turnpike commission.
- 200 Tons, Boston, S. S. Pierce Co. warehouse.
- 140 Tons, Nassau County, N. Y., mostly mesh, highway project S.S.P. 39-2; Good Roads Engineering & Contracting Co., Inc., Wantagh, N. Y., low bidder. (Previously reported.)
- 100 Tons, Buchanan County, Va., highway bridge over Levisa River; Haley, Chisholm & Morris, Inc., Charlottesville, Va., low bidder.

CENTRAL AND WESTERN

- 750 Tons, Seattle, court house; bids in.
- 585 Tons, Kansas City, Mo., 15th Street viaduct; bids April 15.
- 525 Tons, Evanston, Ill., dormitory, Northwestern University.
- 300 Tons, Ogle County, Ill., bridge, route 72, section 119.
- 204 Tons, Frankfort, Ky., State highway letting FA-205-AGS.
- 167 Tons, Las Animas County, Colo., highway work between Walsenburg and Trinidad; bids April 15.
- 164 Tons, State of Wisconsin, 13 bridges; bids April 25.
- 144 Tons, Palo Alto, Cal., hospital; K. E. Parker, San Francisco, low bidder on general contract.
- 130 Tons, Wellston, Mo., high school, Fleischer-Sieger Construction Co., St. Louis, general contractor. (Previously reported.)

Hamilton Coke & Iron Division of the American Rolling Mill Co. will move its sales office to Middletown, the headquarters of the parent company.

The C. M. Kemp Mfg. Co. announces the appointment of the Abrahamson Co., of Buffalo and Rochester, as representatives in western New York State and the appointment of H. G. Mouat, Martin Bldg., Birmingham, as representative in Alabama, Georgia, and Tennessee.

Weekly Bookings of Construction Steel

	Week Ended			Year to Date		
	Apr. 11, 1939	Apr. 4, 1939	Mar. 14, 1938	Apr. 12, 1938	1939	1938
Fabricated structural steel awards	23,925	20,600	22,800	24,800	272,035	212,400
Fabricated plate awards	3,470	4,365	3,705	600	47,240	47,135
Steel sheet piling awards	4,060	0	180	1,400	17,265	10,050
Reinforcing bar awards	4,800	5,325	5,150	5,625	122,520	74,195
Total Letting of Construction Steel ..	36,255	30,290	31,835	32,425	459,060	343,780

FABRICATED STEEL

... Lettings higher at 23,925 tons as against 20,600 tons last week . . . New projects advance to 17,800 tons from 15,450 tons a week ago . . . Plate awards call for 3470 tons.

NORTH ATLANTIC STATES AWARDS

6000 Tons, Ulster County, N. Y., contract 316, Delaware Aqueduct, to Carnegie-Illinois Steel Corp., Pittsburgh; Walsh Construction Co. general contractor.
290 Tons, Washington, juvenile court building, to Bethlehem Steel Co., Bethlehem, Pa.
255 Tons, Stratford, Conn., Sikorsky aircraft factory, to Truscon Steel Co., Youngstown, through Edwin Muss & Son, Inc.
250 Tons, Washington, building addition for Frank R. Jelleff, Inc., to Barber & Ross, Washington.
230 Tons, Sinclairville, N. Y., Junior-Senior High School, to Buffalo Structural Steel Co., Buffalo.
210 Tons, Washington, Thomas Jefferson Memorial, to Fort Pitt Bridge Works Co., Pittsburgh.

NORTH ATLANTIC

190 Tons, Rome, N. Y., Murphy Memorial hospital building, to American Bridge Co., Pittsburgh, through White Construction Co.
165 Tons, Bernardston, Mass., State railroad bridge, to Bethlehem Steel Co., Bethlehem, Pa.
150 Tons, Boston, S. S. Pierce Co. warehouse, to New England Structural Co., Everett, Mass.
140 Tons, Philadelphia, flat rendering building, to Hess Iron Works, Philadelphia.
135 Tons, New York, guard rail, Major Deegan Boulevard, to North American Iron & Steel Co., Brooklyn.
105 Tons, Long Island City, N. Y., Gordon Baking Co. garage, to Belmont Iron Works, Philadelphia.
100 Tons, Arlington-Sandgate, Vt., two State bridges, to an unnamed fabricator, through Dennis B. Riggs, Troy, N. Y. contractor.
100 Tons, Wardsboro-Jamaica, Vt., State bridge, to American Bridge Co., Pittsburgh, through Carlo Bianchi & Co., Inc., Framingham, Mass., contractor.

THE SOUTH

3025 Tons, Middleton, Tenn., 44 transmission towers for TVA, to American Bridge Co., Pittsburgh.
1475 Tons, Dahlgren, Va., Potomac River Bridge foundations, to Carnegie-Illinois Steel Co., Pittsburgh.
1345 Tons, Florence, Ala., 195 transmission towers for TVA, to American Bridge Co., Pittsburgh.
820 Tons, Sumter County, S. C., bridge, to Virginia Bridge Co., Roanoke, Va., through Joseph W. Barnwell, Jr.
195 Tons, Nicholas County, W. Va., bridge, to Pittsburgh-Des Moines Steel Co., Pittsburgh, through Monty Bros., Charleston, W. Va.

CENTRAL STATES

4210 Tons, Chicago, South Side Vocational School, to Duffin Iron Works, Chicago.
1000 Tons, Ulster County, N. Y., Delaware Aqueduct, contract 313, to Archer Iron Works, Chicago, through Sam Rosoff, Ltd., New York. (Previously reported as 450 tons).
890 Tons, Lansing, Mich., auditorium, Michigan State College, to Fort Pitt Bridge Works Co., Pittsburgh.
485 Tons, Winfield, Kan., bridge, to Kansas City Structural Steel Co., Kansas City, Kan., through List Construction Co., Kansas City, Mo.
450 Tons, Abilene, Kan., power house, Kansas Light & Power Co., to Missouri Valley Bridge & Iron Co., Leavenworth, Kan.

125 Tons, Chicago, foundry building addition for unnamed company.

WESTERN STATES

6000 Tons, Redding, Cal., Shasta Dam towers.
2000 Tons, Sacramento, Cal., second crossing for Bureau of Reclamation.
500 Tons, State of Oregon, reconstruction of Hood River bridge; bids April 24.
205 Tons, Trinidad, Colo., State bridge.

FABRICATED PLATES AWARDS

2000 Tons, Santa Monica, Cal., pressure holders for Southern Counties Gas Co., to Lacy Mfg. Co., Los Angeles.
1470 Tons, Dahlgren, Va., caissons for Potomac River Bridge, to Carnegie-Illinois Steel Corp., Pittsburgh, through Merritt Chapman & Scott, Meriden, Conn.

PENDING PROJECTS

10,000 Tons, Toledo, Ohio, sections C, D, and E of municipal pipe line; bids received April 12.

SHEET PILING AWARDS

1800 Tons, Cleveland, Cuyahoga River straightening, cut No. 4 bulkhead, to Carnegie-Illinois Steel Corp., Pittsburgh, through Great Lakes Dredge & Dock Co., Cleveland.
670 Tons, Lorain, Ohio, East 21st Street bridge, to National Tube Co., Lorain, through Great Lakes Dredge & Dock Co., Cleveland.
640 Tons, Lorain, Ohio, Erie Avenue bridge, to Carnegie-Illinois Steel Corp., Pittsburgh, through Great Lakes Dredge & Dock Co., Cleveland.
350 Tons, Manitowoc, Wis., sewage plant, to Inland Steel Co., Chicago.
600 Tons, Puerto Rico, United States Navy Department, to Bethlehem Steel Co., Bethlehem, Pa.

PENDING PROJECTS

130 Tons, Lawrence County, Ohio, State Project; Midland Construction Co., Columbus, low bidder. (Previously reported).

FINANCIAL NOTES

Pittsburgh Steel Foundry, Glassport, Pa., reports a net loss of \$280,479 for 1938 against a net profit of \$175,985 or \$2.46 common share in 1937. The company's plant has been shut down since Feb. 28 because of lack of orders but the shutdown followed an impasse with the SWOC when the company asked for a 15 per cent reduction in wage rates. This request was refused by the union. It is understood, however, that chances for a settlement are brighter now than at any time since operations at the plant ceased.

Cleveland-Cliffs Iron Co., Cleveland, has reported 1938 net profit of \$755,759 compared with net profit of \$5,020,903 in 1937. Edward B. Greene, president, and William G. Mather, chairman, describe 1937 as the second best year enjoyed by the company, while 1938 in volume was the second worst year since 1900. Ore shipments in 1938 totaled 1,794,187 tons, compared with shipments of 5,733,879 tons in 1937.

Cliffs Corp., Cleveland, has reported 1938 net profit of \$197,748 compared with net profit of \$745,015 in 1937.

Imports at Philadelphia

PHILADELPHIA — The following iron and steel imports were received here during the past week: 4200 tons of chrome ore from South Africa and 3800 tons of chrome ore from Cuba; 30 tons of ferromanganese from Czechoslovakia; 5 tons of ferrochrome, 15 tons of steel tubes and 9 tons of steel bars from Sweden.

... NON-FERROUS ...

... Sales continue light ... All copper sellers at 10.75c., Valley ... Lead lowered \$2 a ton ... Zinc shipments rise to 45,291 tons in March.

NEW YORK, April 11—With all of Europe still on tenterhooks, the stock market here sagging to new lows and a lack of favorable news concerning the domestic industrial outlook, it is not surprising that domestic consumers apparently find no cause for altering their practice of purchasing supplies to cover only actual business on hand. The procedure necessarily keeps non-ferrous sales at a minimum.

The split copper price that has ex-

isted since the smelters cut quotations to 10.75c. on April 3 was ended this week Monday, when the mine producers came down to this level from 11.25c. At the same time Lake copper producers announced the elimination of the usual $\frac{1}{8}$ c. premium over electrolytic metal and a reduction in prices to the 10.75c. level. Thus, 10.75c. per lb., Connecticut Valley, currently rules on all business, except that done in the open market. In that market a moderate amount of business was done at

10.20c. per lb., Valley, early Monday, but at the close the market firmed to 10.30c. per lb. The foreign market was rather quiet all week, with this morning's sales being done at between 10.15c. and 10.20c. per lb., c.i.f., usual base ports.

Lead

Climaxing a period of light sales and falling London prices, domestic quotations were cut \$2 a ton on Tuesday to 4.75c. per lb., New York. On Tuesday morning the London market opened, after the extensive Easter holidays, at 2.93c. per lb., on spot, making the theoretical import cost 4.78c. per lb. The reduction in prices here followed shortly after receipt of this news. There was a modest increase in sales, mostly prompt, following the price reduction, but the volume was restricted by buyers' hesitancy in going into May positions, which at present are only 25 per cent covered.

Zinc

Despite the low current rate of current sales, it is apparent that spelter consumption is improving slowly. Deliveries in March were 45,291 tons, as compared with 39,828 in February, 46,639 in January and 33,528 in March, 1938. Reserves at the end of March stood at 127,985 tons, or a little less than three months' supply. The past week's prime Western sales were 1281 tons against 2140 tons in the previous week and shipments were 3688 against 3857 tons. Domestic prices remain unchanged at 4.89c. per lb., New York, with the key to future movements still the London price. On first call this morning this latter price was around 2.77c. per lb. on spot metal.

Tin

With the London market closed from Thursday to this morning for the Easter holidays, buyers displayed only casual interest in the market here in the past week and very little business was transacted. The London market opened this morning very weak and quotations at NEW YORK dropped 30 points from Yesterday's level to 45.95c. per lb., New York, on prompt Straits. During the rest of the week prices were mostly nominal. On first call abroad this morning cash standards were £214 against £215 a week ago.

Horace T. Potts Co., Philadelphia, announces the addition of a line of bronze products to its line of iron and steel products. The new line includes all sizes of standard bronze machine bearings and precision bronze bars, both solid and cored, as produced by the Bunting Brass & Bronze Co. of Toledo, Ohio.

NON-FERROUS PRICES

Cents per lb. for early delivery

	Apr. 5	Apr. 6	Apr. 7	Apr. 8	Apr. 10	Apr. 11
Copper, Electrolytic	10.75	10.75	10.75	10.75	10.75	10.75
Copper, Lake	11.375	11.375	11.375	11.375	10.75	10.75
Tin, Straits, New York	46.15	46.20	46.25	...	46.25	45.95
Zinc, East St. Louis ^a	4.50	4.50	4.50	4.50	4.50	4.50
Lead, St. Louis ^a	4.70	4.70	4.70	4.70	4.70	4.60

^aDelivered Conn. Valley, deduct $\frac{1}{4}$ c. for New York delivery. ^bAdd 0.39c. for New York delivery. ^cAdd 0.15c. for New York delivery.

Warehouse Prices

Cents per lb., Delivered

	New York	Cleveland
Tin, Straits pig	47.25c.	49.25c.
Copper, Lake	11.75c.	11.875c.
Copper, electro	11.75c.	11.875c.
Copper, Castings	11.25c.	11.50c.
*Copper sheets, hot-rolled	18.87c.	18.87c.
*High brass sheets	16.98c.	16.98c.
*Seamless brass tubes	19.73c.	19.73c.
*Seamless copper tubes	19.37c.	19.37c.
*Brass rods	12.31c.	12.31c.
Zinc slabs	6.15c.	6.90c.
Zinc sheets, No. 9 casks	10.50c.	12.10c.
Lead, American pig	5.85c.	5.60c.
Lead, bar	6.35c.	8.35c.
Lead, sheets, cut	8.00c.	8.00c.
Antimony, Asiatic	15.00c.	17.00c.
Alum., virgin, 99 per cent plus	22.50c.	22.50c.
Alum., No. 1 remelt, 98 to 99 per cent	19.50c.	19.50c.
Solder, $\frac{1}{2}$ and $\frac{1}{2}$	28.175c.	28.50c.
Babbitt metal, commercial grade	21.25c.	20.75c.

*Corrected

*These prices, which are also for delivery from Chicago warehouses, are quoted with the following percentages allowed off for extras: on copper sheets, 33 $\frac{1}{3}$; on brass sheets and rods, 40, and on brass and copper tubes, 25.

Old Metals

Cents per lb., New York

Buying prices are paid by dealers for miscellaneous lots from smaller accumulators. Selling prices are those charged to consumers after the metal has been prepared for their uses.

	Dealers' Buying Prices	Dealers' Selling Prices
Copper, hvy. crucible	8.125c.	9.875c.
Copper, hvy. and wire	7.125c.	7.625c.
Copper, light and bottoms	6.375c.	6.625c.
Brass, heavy	4.25c.	4.75c.
Brass, light	3.375c.	4.125c.
Hvy. machine composition	6.25c.	7.75c.
No. 1 yel. brass turnings	4.00c.	4.50c.
No. 1 red brass or composition turnings	6.00c.	6.625c.
Lead, heavy	3.625c.	4.50c.
Cast aluminum	6.50c.	7.75c.
Sheet aluminum	12.25c.	13.75c.
Zinc	2.125c.	3.375c.

Miscellaneous Non-Ferrous Prices

ALUMINUM, delivered: virgin, 99 per cent plus, 20c.-21c. a lb.; No. 12 remelt No. 2 standard, 19c.-19.50c. a lb. NICKEL, electrolytic, 35c.-36c. a lb. base refinery, lots of 2 tons or more. ANTIMONY, prompt, New York; Asiatic, 14c. a lb., f.o.b.; American, 11.50c. a lb. QUICKSILVER, \$89.50-\$90.50 per flask of 76 lb. BRASS INGOTS, commercial 85-5-5, 10.50c. a lb.

IRON AND STEEL SCRAP

... Market exhibits weakness in many sections . . . No. 1 steel down \$1 at Youngstown . . . Composite off 17c. to \$15.08.

APRIL 11—Sentiment is on the weak side throughout the country and were it not for a scarcity of No. 1 steel at Pittsburgh and an anomalous export market at Philadelphia, holding these markets rigid as to price, a much larger drop than 17c. would be reflected in this week's composite figure of \$15.08. Although no mill sales have been made in Chicago in a month, on the basis of recent dealer-broker transactions, the quoted price to consumers has been reduced 50c. on the prime grades there. Brokers at Philadelphia for some unknown reason are paying as high as \$1 more for material than recent export orders would justify on a profit basis and this situation has kept up domestic prices.

Worst break took place at Youngstown, where leading grades are being offered at \$1 less than previously published figures. No. 1 steel and related items are also softer at Cleveland, being quoted 50c. less on the average. Dealer buying prices at Cincinnati are down 50c. on the whole list, reflecting the weak undertone in the market. St. Louis prices are weaker, following a small sale of No. 2 steel. Sentiment is bearish at Detroit and prices are softer.

New export orders totaling over 100,000 tons are in line with recently extended contracts, with \$15 being paid for No. 1, f.a.s. A small tonnage of railroad No. 1 went for \$16.75, however.

Pittsburgh

Sentiment in the market is definitely toward the weak side and lack of buying has produced a listless and inactive market. Despite these factors, some brokers continue to pay \$15.50 for No. 1 heavy melting on what little business there is to cover while certain consuming points in the district continue to pay around \$16 a ton for No. 1. It is believed that a sale into consumption in the immediate district could be made at \$15.50 for No. 1 heavy melting. Odd cars of distress material are being let go for less than \$15.50.

Chicago

Heavy melting steel is down 50c. this week to \$13.50 to \$14, on the basis of broker-dealer transactions and sales of railroad steel at reduced figures. Some distress cars of No. 1 are being picked up by brokers at \$13 but regular sales are at \$13.50. The Burlington withdrew a list

last week when offered \$11.25 net on track and the North Western sold the week previous for \$11.75 net, thus establishing the market within the quoted range. Most items on the list have also been reduced. The last mill sale was at \$14.50.

Philadelphia

This market continues to have peculiar aspects. With operating rates easing, the domestic situation naturally is quiet, but on the other hand dealers and brokers are certainly not pressing distress scrap on the market. The market undertone is not pessimistic, although all talk of higher prices has disappeared. No price weakness has yet appeared, probably because the exporters continue to offer comparatively high prices of material at Port Richmond. One boat is loading now, and two more are expected in within the next seven days, and at least two of the three boats are scheduled for the Far East. The confusing character of the market is emphasized by the fact that recent export sales were made at from \$1 to \$1.50 under the prices being paid currently by brokers in Philadelphia, leading to the conclusion that brokers are losing money on their orders or that some feature of the transactions is as yet unknown to the market as a whole.

Youngstown

No. 1 heavy melting steel is down \$1 per ton to a range of \$14.50 to \$15. Steel producers have been offered moderate tonnages, around 4000 to 5000 tons, at \$15. Mills continue to regulate shipments in line with the present rate of operations, somewhat reduced from the March level.

Cleveland

The market here is weaker and both open hearth and blast furnace grades are quoted down 50c. per ton this week. Mills out of the market have been offered No. 1 scrap at \$14.50. Shipments are not permitted to come in against old orders at will. Practically the only bright spot here during the past week was the New York Central Railroad list which brought substantially the same prices as received a month ago. However, in the few days following the closing of the list dealer quotations became weaker.

Buffalo

The rise in local steel operations puts potential scrap demand in a better light but as yet has brought about no large sales. Shipments to the larger mills continue to be restrained. There is a fair demand for mixed cupola cast while the market for turnings has seen little activity.

St. Louis

An East Side melter bought a small tonnage of No. 2 heavy melting steel. But there is no sizable buying in sight, and because of this the market for scrap

in St. Louis is weaker, and some prices are lower. Nos. 1 and 2 heavy melting steel, miscellaneous standard section rails, machine shop turnings, steel angle bars and No. 1 machinery cast are 50c. a ton off. Railroad lists: Louisville & Nashville, 5000 tons; Wabash, 4000 tons; Ann Arbor, 600 tons; Gulf Coast Lines, 600 tons.

Cincinnati

Weak undertone persists in the local scrap market. Dealers bid cautiously, hesitant to assume a too speculative position in the face of European uncertainties. Bids are off 50c. a ton to bring the general market more in line with dealers' feelings. Some material has been changing hands to cover commitments, but otherwise the market is quiet.

New York

Following the extension of earlier contracts the week before, representatives of the International Scrap Convention last week placed additional contracts ranging from 15,000 to 20,000 tons apiece among a half dozen brokers. A price of \$16.75 was paid for about 20,000 tons of railroad heavy melting steel. Otherwise, the former price of \$15 for No. 1 and \$13.50 for No. 2 steel and black bundles prevailed. The continuation of the price setup will further help stabilize broker buying prices, which have been unchanged in this market for many months.

Boston

The export market appears a little weaker, although prices are not actually lower. Brokers are still making shipments against old contracts. A boat has left here with 5659 tons for Japan, and a small tonnage went to Antwerp. The Weirton Steel Co. has reentered the market for bundled skeleton but at a reduction of about 25c. a ton in price. The American Steel & Wire Co., Worcester, and the Washburn Wire Co., Phillipsdale, R. I., continue out of the market for material, which leaves Nos. 1 and 2 steel f.o.b. cars without a price basis.

Toronto

Trading in iron and steel scrap continues listless. Dealers have been accumulating scrap and large tonnages have been added to yard holdings in the past two or three weeks. Most of the accumulations, however, are in materials for which there is only small resale demand, chiefly automobile scrap. Some local dealers continue to pile scrap on the local docks in hopes of general improvement in demand with the opening of navigation.

Detroit

Important Detroit brokers are definitely out of the market, in some cases being without orders to buy against. Prices have weakened perceptibly day by day and sentiment has become distinctly bearish this week. All quotations on the Detroit market are down—several of the important ones as much as 75c. Heaviest blow of the week is the reduction of the Detroit open-hearth operating rate from 73 to 55 per cent as the principal consumer took off four open-hearth furnaces, held up shipment of scrap on order, including both open hearth and blast furnace material, and gave no sign of any impending buys.

Iron and Steel Scrap Prices

PITTSBURGH

Per gross ton delivered to consumer:	
No. 1 hvy. mltng. steel.	\$15.50 to \$16.90
Railroad hvy. mltng...	16.25 to 16.75
No. 2 hvy. mltng. steel.	14.25 to 14.75
Scrap rails	16.50 to 17.00
Rails 3 ft. and under.	18.25 to 18.75
Comp. sheet steel ...	15.50 to 16.00
Hand bundled sheets..	14.50 to 15.00
Hvy. steel axle turn...	14.00 to 14.50
Machine shop turn...	9.50 to 10.00
Short shov. turn...	10.50 to 11.00
Mixed bor. & turn...	9.00 to 9.25
Cast iron borings ...	9.00 to 9.25
Cast iron carwheels...	15.00 to 15.50
Hvy. breakable cast...	12.50 to 13.00
No. 1 cupola cast....	15.25 to 15.75
RR. knuckles & cplrs.	17.50 to 18.00
Rail coil & leaf springs	18.00 to 18.50
Rolled steel wheels...	18.00 to 18.50
Low phos. billet crops.	19.00 to 19.50
Low phos. punchings...	17.50 to 18.00
Low phos. plate	16.50 to 17.00

PHILADELPHIA

Per gross ton delivered to consumer:	
No. 1 hvy. mltng. steel.	\$15.50 to \$16.00
No. 2 hvy. mltng. steel.	13.50 to 14.00
Hydraulic bund., new.	14.50 to 15.00
Hydraulic bund., old.	11.50 to 12.00
Steel rails for rolling.	17.00 to 17.50
Cast iron carwheels...	16.50 to 17.00
Hvy. breakable cast...	15.00 to 15.50
No. 1 cast	16.50 to 17.00
Stove plate (steel wks.)	13.00 to 13.50
Railroad malleable ...	15.50 to 16.00
Machine shop turn...	9.50 to 10.00
No. 1 blast furnace...	6.50 to 7.00
Cast borings	6.50 to 7.00
Heavy axle turnings...	10.00 to 10.50
No. 1 low phos. hvy...	17.50 to 18.00
Couplers & knuckles...	17.50 to 18.00
Rolled steel wheels...	17.50 to 18.00
Steel axles	20.00 to 20.50
Shafting	20.50 to 21.00
Spec. iron & steel pipe	12.00 to 12.50
No. 1 forge fire...	12.00 to 12.50
Cast borings (chem.)...	9.50 to 10.00

CHICAGO

Delivered to Chicago district consumers:	
Per Gross Ton	
Hvy. mltng. steel	\$13.50 to \$14.00
Auto. hvy. mltng. steel	
alloy free	12.00 to 12.50
No. 2 auto steel	11.00 to 11.50
Shoveling steel	13.50 to 14.00
Factory bundles	12.50 to 13.00
Dealers' bundles	12.00 to 12.50
Drop forge flashings...	10.00 to 10.50
No. 1 busheling	12.00 to 12.50
No. 2 busheling. old...	5.75 to 6.25
Rolled carwheels...	15.00 to 15.50
Railroad tires, cut...	15.00 to 15.50
Railroad leaf springs.	15.00 to 15.50
Steel coup. & knuckles	15.00 to 15.50
Axle turnings	12.50 to 13.00
Coil springs	16.50 to 17.00
Axle turn. (elec.)...	14.00 to 14.50
Low phos. punchings...	16.00 to 16.50
Low phos. plates 12 in. and under	15.50 to 16.00
Cast iron borings	5.50 to 6.00
Short shov. turn...	7.50 to 8.00
Machine shop turn...	7.00 to 7.50
Rerolling rails	17.00 to 17.50
Steel rails under 3 ft...	16.00 to 16.50
Steel rails under 2 ft...	16.50 to 17.00
Angle bars, steel	15.50 to 16.00
Cast iron carwheels...	12.75 to 13.25
Railroad malleable ...	15.00 to 15.50
Agric. malleable	11.25 to 11.75

Per Net Ton	
Iron car axles	\$18.50 to \$19.00
Steel car axles	18.00 to 18.50
Locomotive tires	13.50 to 14.00
Pipes and flues	9.00 to 9.50
No. 1 machinery cast...	12.00 to 12.50
Clean auto. cast...	12.50 to 13.00
No. 1 railroad cast...	11.00 to 11.50
No. 1 agric. cast....	9.50 to 10.00
Stove plate	7.50 to 8.00
Grate bars	8.50 to 9.00
Brake shoes	9.00 to 9.50

YOUNGSTOWN

Per gross ton delivered to consumer:	
No. 1 hvy. mltng. steel.	\$14.50 to \$15.00
No. 2 hvy. mltng. steel.	13.50 to 14.00
Low phos. plate	15.50 to 16.00
No. 1 busheling	13.75 to 14.25
Hydraulic bundles ...	14.00 to 14.50
Machine shop turn...	9.75 to 10.25

CLEVELAND

Per gross ton delivered to consumer:	
No. 1 hvy. mltng. steel.	\$14.00 to \$14.50
No. 2 hvy. mltng. steel.	13.00 to 13.50
Comp. sheet steel ...	13.50 to 14.00
Light bund. stampings...	10.25 to 10.75
Drop forge flashings...	13.00 to 13.50
Machine shop turn...	7.50 to 8.00
Short shov. turn...	8.00 to 8.50
No. 1 busheling	13.50 to 14.00
Steel axle turnings...	11.50 to 12.00
Low phos. billet and bloom crops	18.00 to 18.50
Cast iron borings	8.00 to 8.50
Mixed bor. & turn...	8.00 to 8.50
No. 2 busheling	8.00 to 8.50
No. 1 cupola cast...	16.50 to 17.00
Railroad grate bars	9.50 to 10.00
Stove plate	9.50 to 10.00
Rails under 3 ft...	17.75 to 18.25
Rails for rolling	18.00 to 18.50
Railroad malleable ...	15.50 to 16.00
Cast iron carwheels	14.00 to 14.50

BUFFALO

Per gross ton delivered to consumer:	
No. 1 hvy. mltng. steel.	\$14.00 to \$14.50
No. 2 hvy. mltng. steel.	12.00 to 12.50
Scrap rails	15.00 to 15.50
New hvy. b'dled sheets	12.00 to 12.50
Old hydraul. bundles...	10.75 to 11.25
Drop forge flashings...	12.00 to 12.50
No. 1 busheling	12.00 to 12.50
Hvy. axle turnings...	10.50 to 11.00
Machine shop turn...	6.50 to 7.00
Knuckles & couplers...	16.50 to 17.00
Coil & leaf springs...	16.50 to 17.00
Rolled steel wheels...	16.00 to 16.50
Low phos. billet crops...	15.50 to 16.00
Shov. turnings	8.75 to 9.25
Mixed bor. & turn...	7.50 to 8.00
Cast iron borings	7.50 to 8.00
Steel car axles	16.50 to 17.00
No. 1 machinery cast...	15.00 to 16.00
No. 1 cupola cast...	14.50 to 15.00
Stove plate	13.00 to 13.50
Steel rails under 3 ft...	18.00 to 18.50
Cast iron carwheels	13.50 to 14.00
Railroad malleable ...	15.00 to 15.50
Chemical borings	9.00 to 9.50

ST. LOUIS

Dealers' buying prices per gross ton delivered to consumer:	
Selected hvy. melting.	\$12.00 to \$12.50
No. 1 hvy. melting...	11.50 to 12.50
No. 2 hvy. melting...	11.00 to 11.50
No. 1 locomotive tires.	13.00 to 13.50
Misc. stand. sec. rails.	13.00 to 13.50
Railroad springs	14.00 to 14.50
Bundled sheets	7.00 to 7.50
No. 1 busheling	7.50 to 8.00
Cast. bor. & turn...	2.50 to 3.00
Machine shop turn...	3.50 to 4.00
Heavy turnings	9.00 to 9.50
Rails for rolling	16.00 to 16.50
Steel car axles	17.00 to 17.50
No. 1 RR. wrought...	10.25 to 10.75
No. 2 RR. wrought...	12.00 to 12.50
Steel rails under 3 ft...	16.00 to 16.50
Steel angle bars	13.00 to 13.50
Cast iron carwheels	14.50 to 15.00
No. 1 machinery cast...	14.00 to 14.50
Railroad malleable ...	12.25 to 12.75
No. 1 railroad cast...	12.50 to 13.00
Stove plate	7.50 to 8.00
Grate bars	8.50 to 9.00
Brake shoes	9.50 to 10.00

CINCINNATI

Dealers' buying prices per gross ton at yards:	
No. 1 hvy. mltng. steel.	\$11.50 to \$12.00
No. 2 hvy. mltng. steel.	10.50 to 11.00
Pipes and flues	9.00 to 9.50
No. 1 machinery cast...	12.00 to 12.50
Clean auto. cast...	12.50 to 13.00
No. 1 railroad cast...	11.00 to 11.50
No. 1 agric. cast....	9.50 to 10.00
Stove plate	7.50 to 8.00
Grate bars	8.50 to 9.00
Brake shoes	9.00 to 9.50
Iron car axles	\$18.50 to \$19.00
Steel car axles	18.00 to 18.50
Locomotive tires	13.50 to 14.00
Pipes and flues	9.00 to 9.50
No. 1 machinery cast.	12.00 to 12.50
Clean auto. cast.	12.50 to 13.00
No. 1 railroad cast.	11.00 to 11.50
No. 1 agric. cast.	9.50 to 10.00
Stove plate.	7.50 to 8.00
Grate bars.	8.50 to 9.00
Brake shoes.	9.00 to 9.50
No. 1 hvy. mltng. steel.	\$14.50 to \$15.00
No. 2 hvy. mltng. steel.	13.50 to 14.00
Low phos. plate	15.50 to 16.00
No. 1 busheling	13.75 to 14.25
Hydraulic bundles ...	14.00 to 14.50
Machine shop turn...	9.75 to 10.25
Short shov. turn...	17.75 to 18.25
Cast iron carwheels	12.75 to 13.25
No. 1 machinery cast.	13.50 to 14.00
No. 1 railroad cast...	12.25 to 12.75
Burnt cast.	6.25 to 6.75
Stove plate.	6.25 to 6.75
Agric. malleable.	11.25 to 11.75
Railroad malleable ...	13.75 to 14.25
Mixed hvy. cast	10.50 to 11.00

BIRMINGHAM

Per gross ton delivered to consumer:	
Hvy. melting steel...	\$12.50 to \$14.00
Scrap steel rails	14.50 to 15.00
Short shov. turnings...	7.50 to 8.10
Stove plate	9.00 to 10.00
Steel axles	15.00 to 16.00
Iron axles	15.00 to 16.00
No. 1 RR. wrought...	10.00
Rails for rolling	16.00 to 16.50
No. 1 cast	14.50
Tramcar wheels	14.00

DETROIT

Dealers' buying prices per gross ton:	
No. 1 hvy. mltng. indus- trial steel	\$10.50 to \$11.00
No. 2 hvy. mltng. steel.	9.00 to 9.50
Borings and turnings...	6.00 to 6.50
Long turnings	5.50 to 6.00
Short shov. turnings...	6.50 to 7.00
No. 1 machinery cast.	13.00 to 13.50
Automotive cast	13.50 to 14.00
Hvy. breakable cast...	9.50 to 10.00
Stove plate	7.75 to 8.25
Hydraul. comp. sheets.	11.50 to 12.00
New factory bushel...	10.50 to 11.00
Sheet clippings	7.75 to 8.75
Flashings	9.50 to 10.00
Low phos. plate scrap.	11.50 to 12.00

* \$1.50 less for truck loads.

† Northern N. J. prices are \$2 to \$2.50 higher.

BOSTON

Dealers' buying prices per gross ton:	
Breakable cast	\$10.15
Machine shop turn...	\$3.38 to \$4.15
Mixed bor. & turn...	\$2.00 to 2.25
Bun. skeleton long...	8.25

PRICES ON FINISHED AND SEMI-FINISHED IRON AND STEEL

Steel prices on these pages are base prices only and f.o.b. mill unless otherwise indicated. On some products either quantity deductions or quantity extras apply. In many cases gage, width, cutting, physical, chemical extras, etc., apply to the base price. Actual realized prices to the mill, therefore, are affected by extras, deductions, and in most cases the amount of freight which must be absorbed in order to meet competition.

SEMI-FINISHED STEEL

Billets, Blooms and Slabs

Pittsburgh, Chicago, Gary, Cleveland, Youngstown, Buffalo, Birmingham, Sparrows Point (Rerolling only). Prices delivered Detroit are \$2 higher. F.o.b. Duluth, billets only. \$2 higher.

Per Gross Ton

Rerolling \$34.00
Forging quality 40.00

Sheet Bars

Pittsburgh, Chicago, Cleveland, Youngstown, Buffalo, Canton, Sparrows Point, Md.

Per Gross Ton

Open hearth or bessemer \$34.00

Skelp

Pittsburgh, Chicago, Youngstown, Coatesville, Pa., Sparrows Point, Md.

Per Lb.

Grooved, universal and sheared 1.90c.

Wire Rods

(No. 5 to 9/32 in.)

Per Gross Ton

Pittsburgh, Chicago or Cleveland \$43.00
Worcester, Mass. 45.00
Birmingham 43.00
San Francisco 52.00
Rods over 9/32 in. or 47/64 in. inclusive, \$5 a ton over base.

SOFT STEEL BARS

Base per Lb.

Pittsburgh, Chicago, Gary, Cleveland, Buffalo and Birmingham 2.25c.
Detroit, delivered 2.35c.
Duluth 2.35c.
Philadelphia, delivered 2.57c.
New York 2.59c.
On cars dock Gulf ports 2.60c.
On cars dock Pacific ports 2.85c.

RAIL STEEL BARS

(For merchant trade)

Pittsburgh, Chicago, Gary, Cleveland, Buffalo, Birmingham 2.10c.
On cars dock Tex. Gulf ports 2.45c.
On cars dock Pacific ports 2.70c.

BILLET STEEL REINFORCING BARS

(Straight lengths as quoted by distributors)

Pittsburgh, Chicago, Gary, Birmingham, Buffalo, Cleveland, Youngstown or Sparrows Pt. 1.90c. to 2.05c.
Detroit, delivered 2.00c. to 2.15c.
On cars dock Tex. Gulf ports 2.25c. to 2.40c.
On cars dock Pacific ports 2.50c.

RAIL STEEL REINFORCING BARS

(Straight lengths as quoted by distributors)

Pittsburgh, Chicago, Gary, Buffalo, Cleveland, Youngstown or Birmingham 1.75c. to 1.90c.
Detroit, delivered 1.85c. to 2.00c.
On cars dock Tex. Gulf ports 2.10c. to 2.25c.
On cars dock Pacific ports 2.35c.

Prices on reinforcing bars have been subject to concessions of \$3 a ton or more from above quotations.

IRON BARS

Chicago and Terre Haute 2.15c.
Pittsburgh (refined) 3.60c.

COLD FINISHED BARS AND SHAFTING*

Base per Lb

Pittsburgh, Buffalo, Cleveland, Chicago and Gary 2.70c.
Detroit 2.75c.

* In quantities of 10,000 to 19,999 lb.

PLATES

Base per Lb.

Pittsburgh, Chicago, Gary, Birmingham, Sparrows Point, Cleveland, Youngstown, Coatesville, Claymont, Del., Philadelphia, del'd 2.10c.
New York, del'd 2.15c.
On cars dock Gulf ports 2.25c.
On cars dock Pacific ports 2.40c.
Wrought iron plates, P't'g. 3.80c.

FLOOR PLATES

Pittsburgh or Chicago 3.35c.
New York, del'd 3.71c.
On cars dock Gulf ports 3.70c.
On cars dock Pacific ports 3.95c.

STRUCTURAL SHAPES

Base per Lb.

Pittsburgh, Chicago, Gary, Buffalo, Bethlehem or Birmingham 2.10c.
Philadelphia, del'd 2.21c.
New York, del'd 2.27c.
On cars dock Gulf ports 2.45c.
On cars dock Pacific ports 2.70c.

STEEL SHEET PILING

Base per Lb.

Pittsburgh, Chicago or Buffalo 2.40c.
On cars dock Gulf ports 2.85c.
On cars dock Pacific ports 2.90c.

RAILS AND TRACK SUPPLIES

F.o.b. Mill

Standard rails, heavier than 60 lb., per gross ton \$40.00
Angle bars, per 100 lb. 2.70

F.o.b. Basing Points

Light rails (from billets) per gross ton \$40.00
Light rails (from rail steel) per gross ton 39.00

Base per Lb.

Cut spikes 3.00c.
Screw spikes 4.55c.
Tie plates, steel 2.15c.
Tie plates, Pacific Coast ports 2.25c.
Track bolts, to steam railroads 4.15c.
Track bolts to jobbers, all sizes (per 100 counts) 65-5

Basing points on light rails are Pittsburgh, Chicago and Birmingham; on spikes and tie plates, Pittsburgh, Chicago, Portsmouth, Ohio, Weirton, W. Va., St. Louis, Kansas City, Minnequa, Colo., Birmingham and Pacific Coast ports; on tie plates alone, Steelton, Pa., Buffalo; on spikes alone, Youngstown, Lebanon, Pa., Richmond, Va.

SHEETS

Hot Rolled

Base per Lb.

Pittsburgh, Gary, Birmingham, Buffalo, Sparrows Point, Cleveland, Youngstown, Middletown or Chicago 2.15c.
Detroit, delivered 2.25c.
Philadelphia, delivered 2.32c.
Granite City 2.25c.
On cars dock Pacific ports 2.65c.
Wrought iron, Pittsburgh 4.25c.

Cold Rolled*

Pittsburgh, Gary, Buffalo, Youngstown, Cleveland, Middletown or Chicago 3.20c.
Detroit, delivered 3.30c.
Granite City 3.30c.
Philadelphia, delivered 3.52c.
On cars dock Pacific ports 3.80c.

* Mill run sheets are 10c. per 100 lb. less than base; and primes only, 25c. above base.

Galvanized Sheets, 24 Gage

Pittsburgh, Chicago, Gary, Sparrows Point, Buffalo, Middletown, Youngstown or Birmingham 3.50c.
Philadelphia, delv'd 3.67c.
Granite City 3.60c.
On cars dock Pacific ports 4.00c.
Wrought iron Pittsburgh 6.10c.

Electrical Sheets

(F.o.b. Pittsburgh)

	Base per Lb.
Field grade	3.20c.
Armature	3.55c.
Electrical	4.05c.
Motor	4.95c.
Dynamo	5.65c.
Transformer 72	6.15c.
Transformer 65	7.15c.
Transformer 58	7.65c.
Transformer 52	8.45c.

Silicon Strip in coils—Sheet price plus sur. on sheet extra width extra plus 25c. per 100 lb. for coils. Pacific ports add 70c. a 100 lb.

Long Ternes

No. 24 unassorted 8-lb. coating f.o.b. Pittsburgh or Gary 3.95c.
F.o.b. cars dock Pacific ports 4.65c.

Vitreous Enameling Stock, 20 Gage*

	Base per Lb.
Pittsburgh, Chicago, Gary, Youngstown, Middletown or Cleveland	3.35c.
Detroit, delv'd	3.45c.
Granite City	3.45c.
On cars dock Pacific ports	3.95c.

TIN MILL PRODUCTS

*Tin Plate

	Per Base Box
Standard cokes, Pittsburgh, Chicago and Gary	\$5.00
Standard cokes, Granite City	5.16

* Prices effective Nov. 18 on shipments through first quarter of 1939.

Special Coated Manufacturing Ternes

	Per Base Box
Granite City	\$4.40
Pittsburgh or Gary	4.38

Roofing Terne Plate

(F.o.b. Pittsburgh)

	(Per Package, 112 sheets, 20 x 28 in.)
8-lb. coating I.C.	\$12.00
15-lb. coating I.C.	14.00
20-lb. coating I.C.	15.00
25-lb. coating I.C.	16.00
30-lb. coating I.C.	17.25
40-lb. coating I.C.	19.50

Black Plate, 29 gage and lighter

Pittsburgh, Chicago and Gary	3.05c.
Granite City	3.15c.
On cars dock Pacific ports, boxed	4.00c.

HOT ROLLED STRIP

(Widths up to 12 in.)

	Base per Lb.
Pittsburgh, Chicago, Gary, Cleveland, Middletown, Youngstown or Birmingham	2.15c.
Detroit, delivered	2.25c.

Cooperage Stock

Pittsburgh & Chicago 2.26c.

COLD ROLLED STRIP*

	Base per Lb.
Pittsburgh, Youngstown or Cleveland	2.95c.
Chicago	3.05c.
Detroit, delivered	3.05c.
Worcester	3.15c.

* Carbon 0.25 and less.

Commodity Cold Rolled Strip

Pittsburgh, Youngstown, or Cleveland	3.10c.
Detroit, delivered	3.20c.
Worcester	3.50c.

COLD ROLLED SPRING STEEL

Pittsburgh and Cleveland Worcester

Carbon	0.26-0.50%	2.95c.	3.15c.
Carbon	.51 .75	4.30c.	4.50c.
Carbon	.76-1.00	6.15c.	6.35c.
Carbon	1.01 to 1.25	8.35c.	8.55c.

WIRE PRODUCTS

(Carload lots, f.o.b. Pittsburgh, Chicago, Cleveland and Birmingham)

To Manufacturing Trade

Per Lb.

Bright wire	2.60c.
Galvanized wire, base	2.65c.*
Spring wire	3.20c.

* On galvanizing wire to manufacturing trade, size and galvanizing extras are charged, the price Nos. 6 to 9 gage, inclusive, thus being 3.15c.

To the Trade

Base per Keg

Standard wire nails	\$2.45
Coated nails	2.45
Cut nails, carloads	3.60

Base per 100 Lb.

Annealed fence wire	\$2.95
Galvanized fence wire	3.35
Polished staples	3.15
Galvanized staples	3.40
Twisted barbless wire	3.30
Woven wire fence, base column	.67
Single loop bale ties, base col.	.56
Stand. 2 pt., 12.5 gage barbed cattle wire, per 80 rod spool	\$2.62
Stand. 2 pt., 12.5 gage barbed hog wire, per 80 rod spool	\$2.80

Note: Birmingham base same on above items, except spring wire.

Add \$4 a ton for Mobile, Ala.; \$5 for New Orleans; \$6 for Lake Charles to above bases, except on galvanized and annealed merchant fence wire, which are \$1 a ton additional in each case.

STEEL AND WROUGHT IRON PIPE AND TUBING

Welded Pipe

Base Discounts, f.o.b. Pittsburgh District and Lorain, Ohio, Mills

F.o.b. Pittsburgh only on wrought iron pipe.

Butt Weld

Steel	Wrought Iron
In. Black Galv.	In. Black Galv.
1/8 .56 36	1/8 & 1/8 + 9 + 30
1/4 to 3/8 .59 43 1/2	1/2 .24 6 1/2
1/2 .63 1/2 54	3/4 .30 13
3/4 .66 1/2 58	1 & 1/4 .34 19
1 to 3 .68 1/2 60 1/2	1 1/2 .38 21 1/2
2	2 .37 1/2 21

Lap Weld

2	52 1/2	2	30 1/2 15
2 1/2 & 3 .64	55 1/2	2 1/2 to 3 1/2	31 1/2 17 1/2
3 1/2 to 6 .66	57 1/2	4	33 1/2 21
7 & 8 .65	55 1/2	4 1/2 to 8 .32 1/2 20	
9 & 10 .64 1/2	55	9 to 12 .28 1/2 15	
11 & 12 .63 1/2	54		

Butt weld, extra strong, plain ends	1/8 .54 1/2 41 1/2	1/4 & 1/8 + 10 + 43
1/2 to 3/8 .56 1/2 45 1/2	1/2 .25 9	
1/2 .61 1/2 53 1/2	3/4 .31 15	
3/4 .65 1/2 57 1/2	1 to 2 .38 22 1/2	
1 to 3 .67 60		

Lap weld, extra strong, plain ends	2	51 1/2	2	33 1/2 18 1/2
2	59	51 1/2	2	33 1/2 18 1/2
2 1/2 & 3 .63	55 1/2	2 1/2 to 3 1/2	31 1/2 17 1/2	
3 1/2 to 6 .66	57 1/2	4	33 1/2 21	
7 & 8 .65	55 1/2	4 1/2 to 8 .32 1/2 20		
9 & 10 .64 1/2	55	7 & 8 .38 24 1/2		
11 & 12 .63 1/2	54	9 to 12 .32 20 1/2		

On butt weld and lap weld steel pipe jobbers are granted a discount of 5%. On less-than-carload shipments prices are determined by adding 25 and 30% and the carload freight rate to the base card.

F.o.b. Gary prices are two points lower discount or \$4 a ton higher than Pittsburgh or Lorain on lap weld and one point lower discount, or \$2 a ton higher, on all butt weld 8 in. and smaller.

Boiler Tubes

Seamless Steel and Lap Weld Commercial Boiler Tubes and Locomotive Tubes. Minimum Wall. (Net base prices per 100 ft. f.o.b. Pittsburgh in carload lots)

Lap	Seamless	Weld
Cold	Hot	Hot
Drawn	Rolled	Rolled
1 in. o.d. 13 B.W.G. \$ 9.01	\$ 7.32	...
1 1/4 in. o.d. 13 B.W.G.	10.67	9.26
1 1/2 in. o.d. 13 B.W.G.	11.70	10.23
1 3/4 in. o.d. 13 B.W.G.	12.42	11.64
2 in. o.d. 13 B.W.G.	15.03	13.04
2 1/4 in. o.d. 13 B.W.G.	16.76	14.54
2 1/2 in. o.d. 12 B.W.G.	18.45	16.01
2 1/2 in. o.d. 12 B.W.G.	20.21	17.54
2 1/2 in. o.d. 12 B.W.G.	21.42	18.59
3 in. o.d. 12 B.W.G.	22.48	19.50
3 1/4 in. o.d. 11 B.W.G.	23.37	24.62
4 in. o.d. 10 B.W.G.	35.20	30.54
4 1/4 in. o.d. 10 B.W.G.	43.04	37.35
5 in. o.d. 9 B.W.G.	54.01	46.87
6 in. o.d. 7 B.W.G.	82.93	71.96

Extras for less carload quantities:

40,000 lb. or ft. over	Base
30,000 lb. or ft. to 39,999 lb. or ft.	5%
20,000 lb. or ft. to 19,999 lb. or ft.	10%
5,000 lb. or ft. to 9,999 lb. or ft.	20%
2,000 lb. or ft. to 4,999 lb. or ft.	30%

Under 2,000 lb. or ft. 45%

CAST IRON WATER PIPE

Per Net Ton

6-in. and larger, del'd Chicago	\$51.00
6-in. and larger, del'd New York	49.00
*6-in. and larger, Birmingham	43.00
6-in. and larger, f.o.b. dock, San Francisco or Los Angeles	52.00
F.o.b. dock, Seattle	52.00
4-in. f.o.b. dock, San Francisco or Los Angeles	55.00
F.o.b. dock, Seattle	52.00

Class "A" and gas pipe, \$3 extra 4-in. pipe is \$3 a ton above 6-in.

Prices for lots of less than 200 tons. For 200 tons and over, 6-in. and larger is \$42, Birmingham, and \$50 delivered Chicago and 4-in. pipe, \$45, Birmingham, and \$54 delivered Chicago.

BOLTS, NUTS, RIVETS, SET SCREWS

Bolts and Nuts

(F.o.b. Pittsburgh, Cleveland, Birmingham or Chicago)

Per Cent Off List

Machine and carriage bolts:	
1/2 in. & 6 in. and smaller	68 1/2
Larger and longer up to 1 in.	66
1 1/4 in. and larger	64
Lag bolts	66
Plow bolts, Nos. 1, 2, 3 and 7	68 1/2
Hot pressed nuts, and c.p.c. and t-nuts, square or hex. blank or tapped:	
1/2 in. and smaller	67
9/16 in. to 1 in. inclusive	64
1 1/8 in. and larger	62

On the above items with the exception of plow bolts, there is an additional allowance of 10 per cent for full container quantities.

On all of the above items, there is an additional 5 per cent allowance for carload shipments.

Semi-fin. hexagon nuts U.S.S. S.A.E. 1/2 in. and smaller ... 67 70
9/16 to 1 in. ... 64 65
1 1/8 in. and larger ... 62 62

In full container lots, 10 per cent additional discount.

Stove bolts in packages, nuts attached ... 72 1/2 Stove bolts in packages, with nuts separate ... 72 1/2 and 12 1/2 Stove bolts in bulk ... 84

On stove bolts freight is allowed to destination on 200 lb. and over.

Large Rivets

(1/2 in. and larger)

Base Per 100 Lb.

F.o.b. Pittsburgh, Cleveland, Chicago, Birmingham ... \$3.40

Small Rivets

(7/16 in. and smaller)

Per Cent Off List

F.o.b. Pittsburgh, Cleveland, Chicago, Birmingham ... 65 and 10

Cap and Set Screws

(Freight allowed to destination)

Per Cent Off List

Milled hexagon head, cap screws, 1 in. dia. and smaller	... 50 and 10
Milled headless set screws, cut thread 3/4 in. and smaller	... 70
Upset hex. head cap screws U.S.S. or S.A.E. thread 1 in. and smaller	... 67 1/2
Upset set screws, cup and oval points	... 75
Milled studs	... 60

Base price, \$56.00 a gross ton.

Alloy Steel Bars

F.o.b. Pittsburgh, Chicago, Buffalo, Bethlehem, Massillon or Canton.

Open-hearth grade, base ... 2.30c.

Delivered, Detroit ... 2.90c.

S.A.E. Alloy

Series Differential

Numbers per 100 Lb.

200 (1/2 % Nickel) ... \$0.35

2100 (1 1/2 % Nickel)	\$0.15
2300 (3 1/2 % Nickel)	1.55
2500 (5 % Nickel)	2.25
3100 Nickel-chromium	0.70
3200 Nickel-chromium	1.85
3300 Nickel-chromium	3.80
3400 Nickel-chromium	3.20
4100 Chromium-molybdenum (0.15 to 0.25 Molybdenum)	0.55
4100 Chromium-molybdenum (0.25 to 0.40 Molybdenum)	0.75
4600 Nickel - molybdenum (0.20 to 0.30 Mo. 1.50 to 2.00 Ni.)	1.10
5100 Chrome steel (0.60-0.90 Cr.)	0.35
5100 Chrome steel (0.80-1.10 Cr.)	0.45
6100 Chromium-vanadium bar	1.20
6100 Chromium-vanadium spring steel	0.15
6100 Chromium-vanadium	0.35
Chromium-nickel vanadium	1.56
Carbon-vanadium	0.35

These prices are for hot-rolled steel bars. The differential for most grades in electric furnace steel is 50c. higher. Slabs with a section area of 16 in. and 2 1/2 in. thick or over take the billet base.

Alloy Cold-Finished Bars

F.o.b. Pittsburgh, Chicago, Gary, Cleveland or Buffalo, 3.40c. base per lb. Delivered Detroit, 3.50c., carlots.

CORROSION & HEAT RESISTANT ALLOYS

(Base prices, cents per lb. f.o.b. Pittsburgh)

Chrome-Nickel

No. 304

21.25c.

20.40c.

Bars

25c.

24c.

Plates

29c.

24c.

Structural shapes

25c.

24c.

Sheets

36c.

34c.

Hot-rolled strip

23.50c.

21.50c.

Cold-rolled strip

30c.

28c.

RAW MATERIALS PRICES

PIG IRON

No. 2 Foundry

F.o.b. Everett, Mass.	\$22.00
F.o.b. Bethlehem, Birdsboro and Swedeland, Pa., and Sparrows Point, Md.	22.00
Delivered Brooklyn	24.50
Delivered Newark or Jersey City	23.53
Delivered Philadelphia	22.84
F.o.b. Neville Island, Erie, Pa., Toledo, Chicago, Granite City, Cleveland and Youngstown	21.00
F.o.b. Buffalo	21.00
F.o.b. Detroit	21.00
Southern, delivered Cincinnati	21.06
Northern, delivered, Cincinnati	21.44
F.o.b. Duluth	21.50
F.o.b. Provo, Utah	19.00
Delivered, San Francisco, Los Angeles or Seattle	24.50
F.o.b. Birmingham*	17.38

* Delivered prices on southern iron for shipment to northern points are 38c. a ton below delivered prices from nearest northern basing point on iron with phosphorus content of 0.70 per cent and over.

Malleable

Base prices on malleable iron are 50c. a ton above No. 2 foundry quotations at Everett, Eastern Pennsylvania furnaces, Erie and Buffalo. Elsewhere they are the same, except at Birmingham and Provo, which are not malleable iron basing points.

Basic

F.o.b. Everett, Mass.	\$21.50
F.o.b. Bethlehem, Birdsboro, Swedeland and Steelton, Pa., and Sparrows Point, Md.	21.50
F.o.b. Buffalo	20.00
F.o.b. Neville Island, Erie, Pa., Toledo, Chicago, Granite City, Cleveland and Youngstown	20.50
Delivered Philadelphia	22.34
Delivered Canton, Ohio	21.89
Delivered Mansfield, Ohio	22.44
F.o.b. Birmingham	16.00

Bessemer

F.o.b. Buffalo	\$22.00
F.o.b. Everett, Mass.	23.00
F.o.b. Bethlehem, Birdsboro and Swedeland, Pa.	23.00
Delivered Newark or Jersey City	24.53
Erie, Pa., and Duluth	22.00
F.o.b. Neville Island, Toledo, Chicago and Youngstown	21.50
F.o.b. Birmingham	22.00
Delivered Cincinnati	22.11
Delivered Canton, Ohio	22.89
Delivered Mansfield, Ohio	23.44

Low Phosphorus

Basing points: Birdsboro, Pa., Steelton, Pa., and Standish, N. Y. 26.50

Gray Forge

Valley or Pittsburgh furnace... \$20.50

Charcoal

Lake Superior furnace \$25.00
Delivered Chicago 28.34

Canadian Pig Iron

Per Gross Ton

Montreal

Foundry Iron	\$24.50 base
Malleable	25.00 base
Basic	24.50 base

Toronto

Foundry iron	\$22.50 base
Malleable	23.00 base
Basic	22.50 base

On all grades 2.25 per cent silicon and under is base. For each 25 points of silicon over 2.25 per cent an extra of 25c. is charged.

FERROALLOYS

Ferromanganese

F.o.b. New York, Philadelphia, Baltimore, Mobile or New Orleans.

Per Gross Ton

Domestic, 80% (carload) \$80.00

Spiegeleisen

Per Gross Ton Furnace

Domestic, 19 to 21% \$28.00

Domestic, 26 to 28% 33.00

Electric Ferrosilicon

Per Gross Ton Delivered; Lump Size

50% (carload lots, bulk) \$69.50*

50% (ton lots in 50 gal. bbl.) 80.50*

75% (carload lots, bulk) 126.00*

75% (ton lots in 50 gal. bbl.) 139.00*

Bessemer Ferrosilicon

F.o.b. Furnace, Jackson, Ohio Per Gross Ton

10.00 to 10.50% \$30.50

For each additional 0.50% silicon up to 12%, 50c. per ton is added. Above 12% add 75c. per ton.

For each unit of manganese over 2%, \$1 per ton additional. Phosphorus 0.75% or over, \$1 per ton additional.

Base prices at Buffalo are \$1.25 a ton higher than at Jackson.

Manganese, each unit over 2%, \$1 a ton additional. Phosphorus 0.75% or over, \$1 a ton additional.

Ferrochrome

Per Lb. Contained Cr., Delivered Carloads, Lump Size, on Contract

4 to 6% carbon 10.50c.*

2% carbon 16.50c.*

1% carbon 17.50c.*

0.10% carbon 19.50c.*

0.06% carbon 20.00c.*

Silico-Manganese

Per Gross Ton, Delivered, Lump Size, Bulk, on Contract

3% carbon \$83.00

2.50% carbon 88.00

2% carbon 93.00

1% carbon 103.00

Other Ferroalloys

Ferrotungsten, per lb. contained W del. carloads \$1.75

Ferrotungsten, 100 lbs. and less 2.00

Ferrovanadium, contract, per lb. contained V, delivered \$2.70 to \$2.90†

Ferro columbium, per lb. contained columbium, f.o.b. Niagara Falls, N. Y., tons lots \$2.25†

Ferrocobaltitanium, 15 to 18% Ti, 7 to 8% C, f.o.b. furnace carload and contract per net ton \$142.50

Ferrocobaltitanium, 17 to 20% Ti, 3 to 5% C, f.o.b. furnace, carload and contract, per net ton \$157.50

Ferrophosphorus, electric, or blast furnace material, in carloads, f.o.b. Anniston, Ala., for 18%, with \$3 unitage, freight equalized with Rockdale, Tenn., per gross ton \$58.50

Ferrophosphorus, electrolytic, 23-26% in car lots, f.o.b. Monsanto (Siglo), Tenn., 24%, per gross ton, \$3 unitage, freight equalized with Nashville \$75.00

Ferromolybdenum, per lb. Mo. f.o.b. furnace 95c.

Calcium molybdate, per lb. Mo. f.o.b. furnace 80c.

Molybdenum oxide briquettes 48-52% Mo; per lb. contained Mo, f.o.b. Langeloth, Pa. 80c.

* Spot prices are \$5 per ton higher.

† Spot prices are 10c. per lb. of contained element higher.

ORES

Lake Superior Ores

Delivered Lower Lake Ports Per Gross Ton

Old range, Bessemer, 51.50% \$5.25

Non-range, non-Bessemer, 51.50% 5.10

Messabi, Bessemer, 51.50% 5.10

Messabi, non-Bessemer, 51.50% 4.95

High phosphorus, 51.50% 4.85

Foreign Ore

C.i.f. Philadelphia or Baltimore Per Unit

Iron, low phos., copper free, 55% to 58% dry, Algeria 12c.

Iron, low phos., Swedish, average, 68½% iron 12c.

Iron, basic or foundry, Swedish, aver., 65% iron 11c.

Iron, basic or foundry, Russian, aver., 65% iron Nominal

Man., Caucasian, washed 52% 28c.

Man., African, Indian, 44-48% 25c.

Man., African, Indian, 49-51% 28c.

Man., Brazilian, 46 to 48% 27c.

Per Short Ton Unit

Tungsten, Chinese, Wolframite, duty paid, delivered \$18.50

Tungsten, domestic, scheelite delivered \$16.00 to \$18.00

Chrome or (lump) c.i.f. Atlantic Seaboard, per gross ton:

South African (low grade) \$15.00

Rhodesian, 45% 19.00

Rhodesian, 48% 22.50

Turkish, 48-49% 22.50

Turkish, 45-46% 19.00

Turkish, 40-44% 17.00

Chrome concentrates (Turkish) c.i.f. Atlantic Seaboard, per gross ton:

50% \$25.00

48-49% 23.50

FLUORSPAR

Per Net Ton

Domestic washed gravel, 85-5, f.o.b. Kentucky and Illinois mines, all rail \$17.00 to \$18.00

Domestic, f.o.b. Ohio River landing barges 18.00

No. 2 lump, 85-5, f.o.b. Kentucky and Ill. mines 18.00

Foreign, 85% calcium, fluoride, not over 5% silicon, c.i.f. Atlantic ports, duty paid.... 21.50

Domestic No. 1 ground bulk, 95 to 98% calcium fluoride, not over 2½% silicon, f.o.b. Illinois and Kentucky mines.... 31.50

FUEL OIL

Per Gal.

No. 2, f.o.b. Bayonne 3.75c.

No. 6, f.o.b. Bayonne 2.26c.

No. 5 Bur. Stds., del'd Chicago 3.25c.

No. 6 Bur. Stds., del'd Chicago 2.75c.

No. 3 distillate, del'd Cleve'd. 5.50c.

No. 4 industrial, del'd Cleve'd. 5.25c.

No. 5 industrial, del'd Cleve'd. 3.00c.

No. 6 industrial, del'd Cleve'd. 2.75c.

COKE

Per Net Ton

Furnace, f.o.b. Connells-ville, Prompt \$3.75

Furnace, f.o.b. Connells-ville, Prompt \$4.75 to 5.50

Foundry, by - product, Chicago ovens 10.25

Foundry, by - product, del'd New England.... 12.50

Foundry, by - product, del'd Newark or Jersey City 10.88 to 11.40

Foundry, by - product, Philadelphia 10.95

Foundry, by - product, delivered Cleveland 10.30

Foundry, by - product, delivered Cincinnati.... 9.75

Foundry, Birmingham, by - product, del'd St. Louis industrial district 10.75 to 11.00

Foundry, from Birmingham, f.o.b. cars dock Pacific ports 14.75

IRON AND STEEL WAREHOUSE PRICES

PITTSBURGH*

Base per Lb.

***Plates	3.55c.
***Shapes	3.55c.
***Soft steel bars and small shapes	3.60c.
***Reinforcing steel bars stock	2.70c.
Cold finished bars and screw stock	3.70c.
***Hot rolled strip	3.75c.
***Hot rolled sheets	3.50c.
Galv. sheets (24 ga.) 500 lb. to 1499 lb.	4.50c.
Wire, black, soft annealed	3.15c.
Wire, galv., soft	3.55c.
Track spikes (1 to 24 kegs)	3.60c.
Wire nails (in 100-lb kegs)	2.65c.

On plates, structural, bars, strip and hot rolled sheets, base applied to orders of 400 to 1999 lb.

* On reinforcing bars base applied to orders of less than one ton and includes switching and carting charge.

* All above prices for delivery within the Pittsburgh switching district.

** For the time being, these prices are purely nominal as concessions ranging from \$3 to \$5 a ton on these products have been made within the past week or 10 days.

NEW YORK

Base per Lb.

Plates, 1/4 in. and heavier	3.76c.
Structural shapes	3.75c.
Soft steel bars, round	3.94c.
Iron bars, Swed. char-coal	7.50 to 8.25c.
Cold-fin. shafting and screw stock:	
Rounds, squares, hexagons	4.14c.
Flats up to 12 in. wide	4.14c.
Cold-rolled strip, soft and quarter hard	3.66c.
Hot-rolled strip, soft O.H.	4.11c.
*Hot-rolled sheets (8-30 ga.)	3.40c.
Galv. sheets (24 ga.)	4.50c.
Long terne (24 ga.)	5.50 to 6.20c.
Cold-rolled sheets (20 ga.)	
Standard quality	4.60c.
Deep drawing	4.85c.
Stretcher leveled	5.10c.
SAE, 2300, hot-rolled	7.50c.
SAE, 3100, hot-rolled	6.10c.
SAE, 6100, hot-rolled annealed	10.25c.
SAE, 2300, cold-rolled	8.69c.
SAE, 3100, cold-rolled, annealed	7.29c.
Floor plate, 1/4 in. and heavier	5.43c.
Standard tool steel	12.50c.
Wire, black, annealed (No. 9)	4.65c.
Wire, galv. (No. 9)	5.00c.
Open-hearth spring steel	4.75c. to 10.25c.
Common wire nails, per kg in 25 kg lots	\$2.90

*For lots less than 2000 lb.

CHICAGO

Base per Lb.

Plates and structural shapes	3.55c.
Soft steel bars, rounds and angles	3.60c.
Soft steel squares, hexagons, channels and Tees	3.75c.
Hot rolled strip	3.75c.
Floor plates	5.15c.
Hot rolled sheets	3.50c.
Galvanized sheets	4.50c.
Cold rolled sheets	4.45c.
Cold finished carbon bars	3.80c.

Above prices are subject to deductions and extras for quantity and are f.o.b. consumer's plant within Chicago free delivery zone.

CLEVELAND

Base per Lb.

Plates	3.55c.
Structural shapes	3.73c.
Soft steel bars	3.50c.
Reinfor. bars (under 2000 lb.)	2.55c.
Cold-fin. bars (1000 lb. over)	3.80c.
Hot-rolled strip	3.65c.
Cold rolled sheets	4.70c.
Cold-finished strip	3.35c.
Galvanized sheets (No. 24)	4.62c.
Hot-rolled sheets	3.50c.
Floor plates, 3/16 in. and heavier	5.33c.
*Black ann'l'd wire, per 100 lb.	\$3.10
No. 9 galv. wire, per 100 lb.	3.50
Com. wire nails, base per kg	2.60
Hot rolled alloy steel (3100)	6.05c.
Cold rolled alloy steel (3115)	6.85c.

* For 5000 lb. or less.

† 500 lb. base quantity.

Prices shown on hot rolled bars, strip, sheets, shape and plates are for 400 to 1999 lb. Alloy steel, 1000 lb. and over; galvanized sheets, 150 to 1499 lb.; cold rolled sheets, 399 lb. and under.

ST. LOUIS

Base per Lb.

Plates and structural shapes	3.47c.
Bars, soft steel (rounds and flats)	3.72c.
Bars, soft steel (squares, hexagons, ovals, half ovals and half rounds)	3.87c.
Cold fin. rounds, shafting, screw stock	4.07c.
Galv. sheets (24 ga.)	4.53c.
Hot rolled sheets	3.53c.
Galv. corrugated sheets, 24 ga. and heavier*	4.58c.
Structural rivets	5.02c.

* No. 26 and lighter take special prices.

BOSTON

Base per Lb.

Structural shapes, 3 in. and larger	5.85c.
Plates, 1/4 in. and heavier	3.85c.
Bars	3.98c.
Heavy hot rolled sheets	3.86c.
Hot rolled sheets	4.21c.
Hot rolled annealed sheets	4.76c.
Galvanized sheets	4.76c.
Cold rolled sheets	4.93c.

The following quantity differentials apply: Less than 100 lb., plus \$1.50 per 100 lb.; 100 to 399 lb. plus 50c.; 400 to 1999 lb. base; 2000 to 3999 lb. minus 20c.; 10,000 to 39,999 lb. minus 30c.; 40,000 lb. and over minus 40c.

BUFFALO

Base per Lb.

Plates	3.77c.
Floor plates	5.40c.
Struc. shapes	3.55c.
Soft steel bars	3.60c.
Reinforcing bars (20,000 lb. or more)	2.05c.
Cold-fin. flats, squares, rounds, and hex.	3.80
Hot-rolled sheets, 3/16 x 14 in. to 48 in. wide incl. also sizes	
No. 8 to 30 ga.	3.50c.
Galv. sheets (24 ga.)	4.50c.
Bands and hoops	3.97c.

NEW ORLEANS

Base per Lb.

Mild steel bars	4.20c.
Reinforcing bars	3.24c.
Structural shapes	4.10c.
Plates	4.10c.
Hot-rolled sheets, No. 10	4.35c.
Steel bands	4.75c.
Cold-finished steel bars	5.10c.
Structural rivets	4.85c.
Boiler rivets	4.85c.
Common wire nails, base per keg	3.55
Bolts and nuts, per cent off list	60

REFRACTORIES PRICES

Fire Clay Brick

Per 1000 f.o.b. Works

Super-duty brick, at St. Louis	\$60.80
First quality, Pennsylvania, Maryland, Kentucky, Missouri and Illinois	47.50
First quality, New Jersey	52.50
Second quality, Pennsylvania, Maryland, Kentucky, Missouri and Illinois	42.75
Second quality, New Jersey	49.00
No. 1, Ohio	39.90
Ground fire clay, per ton	7.10

Silica Brick

Per 1000 f.o.b. Works

Pennsylvania	\$47.50
Chicago District	55.10

Birmingham

Per net ton

Silica cement per net ton (Eastern) 8.55

Chrome Brick

Per net ton

Standard f.o.b. Baltimore, Plymouth Meeting and Chester	\$47.00
Chemically bonded f.o.b. Baltimore, Plymouth Meeting and Chester, Pa.	47.00

Magnesite Brick

Per net ton

Imported, f.o.b. Baltimore and Chester, Pa. (in sacks)	\$45.00
Domestic, f.o.b. Baltimore and Chester in sacks	40.00

Domestic, f.o.b. Chewelah, Wash. (in bulk) 22.00

PHILADELPHIA

Base per Lb.

Plates, 1/4-in. and heavier	3.40c.
Structural shapes	3.40c.
Soft steel bars, small shapes, iron bars (except bands)	3.60c.
Reinforced, square and deformed	2.61c.
Cold-finished steel bars	4.11c.
Steel hoops	4.10c.
Steel bands, No. 12 and 3/16 in. incl.	3.60c.
Spring steel	4.75c.
Hot-rolled annealed sheets	3.40c.
Galvanized sheets (No. 24)	4.33c.
Diam. pat. floor plates, 1/4 in.	5.00c.

These prices are for delivery in Philadelphia trucking area.

*For quantities between 400 and 1999 lb.

†For 10 bundles or over.

‡For one to five tons.

BIRMINGHAM

Bars and bar shapes	\$3.85 base
Structural shapes and plates	3.75 "
Hot rolled sheets	3.80 "
No. 10 ga.	3.80 "
Hot rolled sheets	4.40 " 3500 lb. and over
No. 24 ga.	4.40 " 3500 lb. and over
Galvanized sheets	5.05 " 3500 lb. or more

Machine and carriage bolts .50 & 10 off list
Rivets (structural) \$4.60 base

On plates, shapes, bars, hot-rolled strip heavy hot-rolled sheets, the base applies on 400 to 3999 lb. All prices are f.o.b. consumer's plant.

PACIFIC COAST

Base per Lb.

	San Francisco	Los Angeles	Seattle
Plates, tanks and U. M.	3.60c.	4.00c.	3.40c.
Shapes, standard	3.60c.	4.00c.	3.40c.
Soft steel bars	3.65c.	4.00c.	3.65c.
Reinforcing bars, f.o.b. cars dock			
Pacific ports	2.275c. open	2.975c.	
Hot-rolled sheets (No. 10)	3.60c.	4.20c.	3.95c.
Galv. sheets (No. 24 and lighter)	5.15c.	4.75c.	4.75c.
Galv. sheets (No. 22 and heavier)	5.40c.	4.75c.	4.75c.
Cold-finished steel			
Rounds	6.55c.	6.60c.	7.10c.
Squares and hexagons	7.80c.	7.85c.	7.10c.
Flats	8.30c.	8.35c.	8.10c.
Common wire nails—base per keg less carload	\$3.20	\$3.00	\$3.00
All items subject to differentials for quantity.			

ST. PAUL

Base per Lb.

Mild steel bars, rounds	4.10c.
Structural shapes	4.00c.
Plates	4.00c.
Cold-finished bars	4.83c.

Hot-rolled annealed sheets, No. 24 4.75c.

On mild steel bars, shapes and plates the base applies on 400 to 14,999 lb. On hot-rolled sheets, galvanized sheets and cold-rolled sheets base applies on 15,000 lb. and over.

Base on cold-finished bars is 1000 lb. and over of a size.

DETROIT

Base per Lb.

Soft steel bars	3.4

PLANT EXPANSION AND EQUIPMENT BUYING

◀ NORTH ATLANTIC ▶

Celanese Corp. of America, Inc., 180 Madison Avenue, New York, cellulose rayon products, has let general contract to Hughes-Foulkrod Co., Schaff Building, Philadelphia, for new mill near Pearisburg, Va., consisting of main three-story unit, 270 x 452 ft., and five one and multi-story structures. A power house will be built, also pumping station, machine shop and other mechanical departments. Cost close to \$5,000,000 with machinery. Later other buildings will be erected to duplicate this initial group.

H. Baron & Co., Inc., 80 Metropolitan Avenue, Brooklyn, food products, has leased a plant on West Elizabeth Avenue, Linden, N.J., for new factory. Improvements will be made and equipment installed at once. Entire project will represent investment in excess of \$75,000.

Quartermaster Supply Officer, Army Base, Fifty-eighth Street and First Avenue, Brooklyn, asks bids until April 19 for four jointers, two drill presses, three lathes, all motor driven, bits, saws, rasps, files and other tools (Circular 626-218).

Continental Baking Co., 630 Fifth Avenue, New York, has let general contract to Samworth Hughes Co., 177 Van Houten Street, Paterson, N.J., for two-story and basement addition at 534 Ellison Place, Paterson, 70 x 160 ft. Cost about \$85,000 with traveling ovens, mixers, conveyors and other equipment.

Bureau of Supplies and Accounts, Navy Department, Washington, asks bids until April 18 for one 36-in. gear shaper (Schedule 6017), heavy-duty engine lathe (Schedule 6020); until April 21, two gear hobs (Schedule 6029), geared-head, heavy-duty engine lathe (Schedule 6028) for Brooklyn Navy Yard; three precision bench lathes (Schedule 5964) for Brooklyn, Mare Island and Puget Sound yards; all motor-driven.

United States Tobacco Co., 630 Fifth Avenue, New York, has let general contract to John Felmley Co., National Bank Building, Bloomington, Ill., for new plant on Petersburg Pike, Richmond, Va., consisting of a main six-story unit, 100 x 350 ft., and several smaller structures. Cost close to \$600,000 with mechanical-handling and other equipment. Schmidt, Garden & Erickson, 104 South Michigan Avenue, Chicago, are architects.

Commanding Officer, Ordnance Department, Watervliet Arsenal, Watervliet, N.Y., asks bids until April 18 for one 6000-lb. four-wheel electric platform truck (Circular 182).

Board of Education, 500 Park Avenue, New York, has plans for new four-story vocational school at 51-79 Fountain Avenue, Brooklyn, for which bids will be asked soon on general contract. Cost close to \$1,800,000 with equipment. Architectural department, Flatbush Avenue Extension and Concord Street, Brooklyn, is in charge.

Sonoco Products Co., Garwood, N.J., paper tubing and paperboard specialties, has approved plans for one-story addition, 100 x 105 ft., for storage and distribution. Cost about \$40,000 with equipment.

Universal Plastics Corp., 235 Jersey Avenue, New Brunswick, N.J., has let general contract to William M. Connolly, 14 Handy Street, for one-story addition, 50 x 120 ft. Cost close to \$45,000 with equipment. Ernest Levine, 46 Paterson Street, is architect.

Commanding Officer, Ordnance Department, Picatinny Arsenal, near Dover, N.J., asks bids until April 17 for one 2500-lb. balanced platen press (Circular 673); until April 21, one electrically-heated autoclave (Circular 653), 5000 steel fin assemblies for 100-lb. demolition bombs, 3975 assemblies for 600-lb. bombs, 1271 for 1100-lb. bombs, and 445 for 2000-lb.

bombs, all riveted or spot welded (Circular 644).

Hercules Powder Co., Delaware Trust Building, Wilmington, Del., has approved plans for addition to branch plant at Hercules, Cal., for production of synthetic ammonia. Cost over \$500,000 with equipment.

Bureau of Supplies and Accounts, Navy Department, Philadelphia, asks bids until April 18 for electric cable and splicing material (Schedule 5988) for Philadelphia Navy Yard.

Commanding Officer, Ordnance Department, Frankford Arsenal, Philadelphia, asks bids until April 18 for one 30-ton simple action, vertical hydraulic press (Circular 938), 3500 ft. of 1½-in. black wrought iron pipe with couplings (Circular 981); until April 19, one 1700-lb. all-metal self-contained warehouse dial scale, with 38 x 46-in. platform (Circular 947), four square turret tool posts, not less than 12 indexing stations (Circular 950).

◀ BUFFALO DISTRICT ▶

Markel Electric Products, Inc., 145 Seneca Street, Buffalo, electric equipment and supplies, has let general contract to Boehm Brothers, Inc., 245 Colorado Avenue, for four-story and basement addition, 50 x 165 ft. Cost over \$60,000 with equipment. Joseph J. Geigand, 196 Crescent Avenue, is architect.

Eastman Kodak Co., Rochester, N.Y., has authorized resumption of expansion for camera works division, initially begun about a year ago and later discontinued, consisting of multi-story building with several smaller units. Cost over \$750,000 with equipment. New seven-story building also will be erected for motion picture film production, to cost close to \$500,000 with equipment. Ridge Construction Co., Kodak Park, is general contractor. Bids will be asked soon on general contract for four-story and basement addition, 75 x 150 ft., to Canadian branch at Mount Dennis, Ont., operated in name of Canadian Kodak Co., Ltd. Cost over \$100,000 with equipment.

◀ WASHINGTON DIST. ▶

Bureau of Yards and Docks, Navy Department, Washington, asks bids until May 10 for two 25-ton and one 15-ton gasoline-electric traveling hammerhead cranes, with alternative proposal for diesel-electric cranes, for Norfolk Navy Yard, Va. (Specifications 8938). Plans are under way for additional buildings at proving grounds, Dahlgren, Va., including one-story locomotive and crane shed, woodworking and carpenter shop, magazine building and garage and service building. Cost about \$140,000 with equipment. Fund is being secured through new naval appropriation bill.

Quartermaster Depot, War Department, Washington, asks bids until April 20 for woodworking machinery for CCC corps, including seven circular saws with motors, six band saws, scroll saw with stand and motor, etc. (Circular 950-137).

Julien P. Friez & Sons, Division of Bendix Aviation Corp., 4 North Central Avenue, Baltimore, manufacturers of aeronautical and other scientific instruments and parts, will take bids on general contract this month for new plant on Joppa Road, Towson, where 18-acre tract recently was acquired. It will comprise main one-story unit, 80 x 400 ft., with wing extension, 100 x 100 ft., and smaller structures. Cost about \$500,000 with equipment. Glidden & Baldwin, 513 North Charles Street, Baltimore, are architects.

General Purchasing Officer, Panama Canal, Washington, asks bids until April 17 for 11,000 ft. of plow steel wire rope, 10,000 ft. of cast steel wire rope, 5000 ft. of galvanized cast steel wire rope, 8000 lb. of galvanized soft steel wire, 4000 ft. of phosphor bronze wire tiller rope, 39,000 lb. common steel wire

nails, 3000 lb. steel track bolts, 2500 lb. wire finishing nails, 5000 lb. galvanized steel wire roofing nails, 2500 lb. galvanized tram nails, 30,000 lb. of steel track spikes, 4000 ft. of galvanized coil chain, one-ton chain hoists, steel snatch blocks, tackle blocks, etc. (Schedule 3439).

Bureau of Supplies and Accounts, Navy Department, Washington, asks bids until April 18 for one hydraulic internal grinder (Schedule 6007) for Washington yard; two heavy-duty lathes (Schedule 5996) for Portsmouth, N.H., yard; 24 seamless steel flasks (Schedule 5950) for Boston, Charleston and Puget Sound yards; one combined hand and electric steering engine with one steering stand unit, controller, limit switch and spare parts (Schedule 6054) for Eastern or Western yard; one quick change gear screw cutting precision lathe (Schedule 6015) for Sewall's Point yard; all machines to be motor driven.

◀ NEW ENGLAND ▶

Bureau of Yards and Docks, Navy Department, Washington, asks bids (no closing date stated) for one-story addition to shipfitters' shop at Portsmouth, N.H., Navy Yard (Specifications 9069). Plans are under way for one-story explosive manufacturing shop at naval torpedo station, Newport, R.I., to cost about \$250,000 with equipment. Appropriation is being secured through new naval public works bill.

Schmidt Loom Works, Inc., Front Street, New Bedford, Mass., textile mill equipment, plans rebuilding part of plant recently destroyed by fire. Loss about \$50,000 with equipment.

Commanding Officer, Ordnance Department, Springfield Armory, Springfield, Mass., asks bids until April 17 for one automatic milling machine for light production (Circular 396); until April 18, 2000 adjustable wrenches, 200 adjustable screw wrenches, 2000 strap pipe wrenches, and 100 20-in. wrench straps for pipe wrenches (Circular 409), 2000 drive pin punches, 2100 common screwdrivers, 600 lead hammers, 400 pairs of soldering coppers and about 39,000 twist drills (Circular 410), one precision bench miller (Circular 394); until April 20, one machine having suitable holding fixtures and cutting tools for drilling and reaming 0.375 hole; drilling, countersinking and reaming 0.189 hole, and drilling and reaming 0.201 and 0.189 holes in line with each other (Circular 378).

◀ SOUTH ATLANTIC ▶

City Council, Abbeville, S.C., asks bids until April 28 for hydraulic turbines, governors, electric generators and accessory equipment for new municipal hydroelectric power plant. Also for power dam, power house, penstock, spillway and auxiliary structures. Fund of \$435,000 has been secured through Federal aid. Wiedeman & Singleton, Candler Building, Atlanta, Ga., are consulting engineers.

Bureau of Yards and Docks, Navy Department, Washington, asks bids until May 3 for one 40-ton and two 15-ton electric traveling jib cranes for Charleston, S.C., Navy Yard (Specifications 9121).

Bureau of Supplies and Accounts, Navy Department, Washington, asks bids until April 21 for one open-throat punch (Schedule 6027) for Charleston, S.C., Navy Yard.

◀ WESTERN PA. DIST. ▶

Pittsburgh & Lake Erie Railroad Co., P. & L. E. Terminal Building, Pittsburgh, asks bids until April 17 for brake shoes (Serial Contract No. 1-1939).

Peerless Coal & Iron Co., Capital City Building, Charleston, W. Va., plans development of coal-mining and natural gas properties near Marlinton, W. Va., with installation of coal-mining plant, power house, machine shop and other mechanical units. Cost reported over \$75,000. Rush Meadows, address noted, is chief engineer.

Quartermaster, CCC, Indiana, Pa., asks bids until April 17 for electrical equipment (Circular 5306-83).

Board of Education, McKeesport, Pa., has asked bids on general contract for three-story vocational school. Cost about \$1,200,000 with equipment. C. R. Moffitt, Chamber of Commerce Building, is architect.

◀ OHIO AND INDIANA ▶

Ohio Wax Paper Co., 780 Frebis Avenue, Columbus, Ohio, plans one-story addition, 70 x 240 ft. Cost over \$250,000 with equipment. Work is scheduled to begin as soon as arrangements are completed with city for use of storm sewer system for mill waste.

Rex Body & Fender Repair Co., 1431 West Twenty-eighth Street, Cleveland, plans one-story addition, 55 x 70 ft., for storage and distribution. Cost close to \$40,000 with equipment. Walter Cladwell, Engineers' Building, is architect.

Prima Mfg. Corp., Sidney, Ohio, manufacturer of washing machines and parts, plans rebuilding plant recently destroyed by fire. Loss over \$300,000 with equipment.

Contracting Officer, Materiel Division, Air Corps, Wright Field, Dayton, Ohio, asks bids until April 17 for wing jacking blocks, in-board jacking points, wing jacking points, etc. (Circular 882); until May 1, CO₂ fixed valve assemblies, portable fire extinguisher valve assemblies, etc. (Circular 883).

Board of Education, Norwalk, Ohio, plans manual training department in new high school, for which general contract has been let to L. M. Leonard Co., East Gay Street, Columbus, Ohio. Cost about \$250,000. Granville E. Scott, Citizens' Building, is architect.

Contracting Officer, Quartermaster Corps, Jeffersonville, Ind., asks bids until April 17 for 48-in. diameter steel wheels for hand carts and steel cart wheel axles; also for 4554 hacksaw blades (Circular 431-152).

Board of Public Works, City Hall, Fort Wayne, Ind., asks bids until April 18 for sewage treatment works, including gas engine-operated blower (Contract 9), two motor-driven centrifugal blowers (Contract 10), and four vertical motor-driven pumping units (Contract 11), screening and grinding equipment (Contract 8) and other machinery. Charles W. Cole, 1030 West Wayne Street, is consulting engineer.

Construction Quartermaster, Fort Benjamin Harrison, Ind., asks bids until April 17 for stokers (Circular 6138-25).

◀ SOUTH CENTRAL ▶

Victor Chemical Works, 141 West Jackson Boulevard, Chicago, plan expansion in branch plant at Mount Pleasant, Tenn., including new production units and equipment. Cost about \$850,000 with machinery. Company recently has arranged financing in amount of \$1,000,000, appropriation to be secured from that fund.

Director of Purchases, Tennessee Valley Authority, Knoxville, Tenn., asks bids until April 21 for steel floating boom for lock wall extension at Pickwick Landing power dam.

Liberty Cherry & Fruit Co., Inc., Second and Madison Streets, Covington, Ky., processed fruits, etc., has asked bids on general contract for one-story addition to plant at Latonia, Ky., about 52,000 sq. ft. of floor space, and improvements in present plant. Cost about \$85,000 with equipment. Carl J. Kiefer Associates, Inc., Schmidt Building, Cincinnati, is consulting engineer.

◀ SOUTHWEST ▶

White Eagle Oil Corp., Division of Socony-Vacuum Oil Co., Inc., Federal Reserve Building, Kansas City, Kan., has let general contract to Hiram Elliott Construction Co., 1016 Baltimore Street, Kansas City, Mo., for one-story car service and repair shop at river-rail pipe line terminal and tank farm in Fairfax industrial district. Cost close to \$50,000 with equipment.

City Council, Eldorado Springs, Mo., is arranging call for bids for equipment for new municipal electric power plant, including diesel engine-generating unit and auxiliary equipment. W. B. Rollins & Co., Railway Exchange Building, Kansas City, Mo., are consulting engineers.

Magnolia Pipe Line Co., Esperson Building, Houston, Tex., subsidiary of Magnolia Petroleum Co., plans rebuilding part of steel tank farm near Eldorado, Ark., recently destroyed by fire. Loss close to \$50,000 with equipment.

Board of Education, Community High School, Chapman, Kan., has begun erection of one-story industrial arts building, 80 x 145 ft., at local high school. Cost about \$50,000 with equipment. Murray & Clayton, Citizens' Bank Building, Abilene, Kan., are architects.

Shell Petroleum Corp., Shell Building, St. Louis, has asked bids on general contract for one-story addition at main oil refinery at Woodriver, Ill., 40 x 140 ft., for storage and distribution. Cost over \$50,000 with equipment.

Coca-Cola Bottling Co., 1101 Second Street, Dallas, Tex., has approved plans for two-story addition, for which superstructure will begin at once. Cost close to \$50,000 with equipment.

Tidewater Associated Oil Co., Esperson Building, Houston, Tex., has let contract to J. F. Pritchard & Co., Dwight Building, Kansas City, Mo., for new gasoline processing and recycling plant in Long Lake oil field, near Tucker, Tex., comprising several units with capacity for handling about 35,000,000 cu. ft. of natural gas daily. Cost about \$300,000 with equipment. Plant will be jointly owned and operated by Tidewater company and Seaboard Oil Co., 39 Broadway, New York.

◀ MICHIGAN DISTRICT ▶

American Forging & Socket Co., Pontiac Mich., automobile body hardware and similar products, plans one-story addition, 120 x 340 ft. Cost over \$150,000 with equipment. L. J. Heenan, Pontiac, is architect.

Ford Motor Co., Dearborn, Mich., has asked bids on general contract for one-story addition to foundry at River Rouge plant, and improvements in present unit. Cost over \$85,000 with equipment. Giffels & Vallet, Inc., Detroit, is architect and engineer.

Union Motor Freight Terminal, Inc., care of Edwin E. Coe, Park Avenue Building, Detroit, recently organized by Mr. Coe and associates, plans new freight terminal on property bounded by West Fort Street, West Jefferson Avenue, Twenty-first and Twenty-third Streets, where about 10 acres has been secured. It will consist of three main one-story units, each about 90 x 400 ft., five-story office and administration building and smaller structures. Cost about \$1,000,000 with mechanical-handling and other equipment. Lane-Davenport-Meyer, Donovan Building, are architects.

Board of Trustees, Michigan State College, East Lansing, Mich., plans extensions and improvements in power plant, including equipment. Cost close to \$400,000. Appropriation will be arranged soon.

◀ MIDDLE WEST ▶

Western-Austin Co., Farnsworth Avenue, Aurora, Ill., manufacturer of road machinery and other mechanical equipment, has asked bids on general contract for one-story addition, 75 x 180 ft., for mechanical paint-spraying and allied service, with spray tunnels and other facilities; also for loading platform, 25 x 100 ft. Cost about \$65,000 with equipment. E. O. Sessions Co., 120 South LaSalle Street, Chicago, is consulting engineer.

Reliance Steel Corp., 1170 Ivanhoe Road, Cleveland, has purchased two one-story buildings on site 125 x 600 ft., at Sixteenth and Wood Streets, Chicago, heretofore held by Gregory Electric Co. Structures are 125 x 180 ft., and 40 x 70 ft. respectively and will be used for branch storage and distribution.

Town Council, Sibley, Iowa, asks bids until April 26 for extensions and improvements in municipal electric power plant, including new boiler unit with generating capacity of 30,000 lb. of steam per hr., stoker, control equipment (Section 6), feedwater pump, feedwater heater, vacuum pumping equipment, water-softening apparatus, power plant piping, etc. (Section 7), switchgear and accessory equipment (Section 10). Young & Stanley, Inc., Muscatine, Iowa, is consulting engineer.

Deere & Mansur Works, 401 Fifth Avenue, Moline, Ill., agricultural equipment, a unit of

Deere & Co., have let general contract to Axel Carlson & Co., 321 Seventeenth Street, for one-story forge shop, 58 x 240 ft. Cost over \$75,000 with equipment.

Coca-Cola Bottling Co., 2035 University Avenue, S. E., Minneapolis, Minn., has asked bids on general contract for one-story branch mechanical-bottling plant, 60 x 100 ft., at Crookston, Minn. Cost about \$50,000 with equipment. Revised plans are being drawn and bids will be asked soon for a similar plant at Fergus Falls, Minn., two stories and basement, 66 x 110 ft. Cost about \$70,000 with equipment. Ernest Schmidt, Coughlin Building, Mankato, Minn., is architect.

Department of Public Buildings, State Capitol, Denver, James Merrick, superintendent, will take bids soon for new power plant and mechanical shop on Sherman Street, 65 x 108 ft., for buildings in State Capitol group. Cost about \$300,000 with equipment. Gordon D. White, 615 Columbine Street, is architect.

Kieckhefer Container Co., Milwaukee, manufacturer of corrugated paper boxes, etc., which recently announced plans to build branch factory at Manitowoc, Wis., costing \$125,000, contemplates \$1,000,000 addition to its pulp mill at Plymouth, N. C., original unit, built three years ago, costing \$3,000,000.

Trans Co., 200 Cameron Street, La Crosse, Wis., heating and air conditioning devices, space heaters, etc., which is completing a large production addition, has plans by Parkinson & Dockendorff, local architects for another unit of factory group, 171 x 124 ft., one-story and basement to be known as Plant No. 2. Cost, with equipment, is estimated at \$150,000.

Duncan Equipment Co., De Pere, Wis., has been organized by John N. Duncan, formerly of Milwaukee, to manufacture kitchen cabinets, sinks, and other wood and metal household devices. A. E. Meyer, formerly general manager, Marathon Electric Co., Wausau, Wis., is treasurer and factory superintendent.

◀ PACIFIC COAST ▶

Associated Telephone Co., 1314 Seventh Street, Santa Monica, Cal., has asked bids on general contract for eight one-story shop and equipment buildings in Signal Hill district, to be built in connection with pole yard at that location. Cost about \$90,000 with equipment and mechanical-handling facilities. Maurice Sasso, 124 West Fourth Street, Los Angeles, is engineer.

Eastman Kodak Co., 241 Battery Street, San Francisco, has asked bids on general contract for two-story addition to local factory branch, storage and distributing plant. Cost over \$65,000 with equipment. Bliss & Fairweather, Hobart Building, are architects.

Board of Directors, Ventura Union High School and Junior College District, Ventura, Cal., has let general contract to Arthur Pinner, Jr., 4354 West Third Street, Los Angeles, for one-story vocational shop at Junior College, Main and Catalina Streets. Cost about \$65,000 with equipment. Harold E. Burket, 468 East Main Street, Ventura, is architect.

General Grocery Co., Portland, has let general contract to George H. Buckler, Lewis Building, for one-story bulk storage and distributing plant, 135 x 275 ft., at Bend, Ore. Cost about \$75,000 with mechanical-handling equipment. Johnston & Brookman, Pittock Block, Portland, are architects.

Bureau of Supplies and Accounts, Navy Department, Washington, asks bids until April 21 for one motor-driven metal-cutting hacksaw (Schedule 5999), press brake (Schedule 6006), universal turret lathe (Schedule 6005); until April 25, one open-side planer and shaper, with spare parts and tools (Schedule 5995), universal turret lathe (Schedule 5994); until April 28, for horizontal balancing static and dynamic machine (Schedule 6025) for Mare Island Navy Yard; steel propeller shafts (Schedule 6052) for Mare Island and Portsmouth yards; until April 18, outfit for protective treatment of aluminum and aluminum alloy (Schedule 6032); until April 28, cadmium plating outfit, complete (Schedule 6031) for San Pedro, Los Angeles yard; until April 21, spare parts for airplane brakes (Schedule 900-2422) for San Diego Naval Air Station. All machines to be motor driven.

THIS WEEK'S MACHINE ... TOOL ACTIVITIES...

Production Climbs as Orders Gain in Cincinnati

CINCINNATI—Local machinery business continues to be about on a parity with March, although weekly comparisons will reveal occasional sudden fluctuations. New orders the past week reflected this pattern with a small increase. Demand from domestic sources showed further gain on the week's business and brought home ordering close to an even level with export demand. Substantial Government orders in recent weeks have helped noticeably to bring greater equilibrium to ordering. Millers, grinders and lathes are still most active, while boring mills, shapers and planers are not far behind in interest. Drilling machinery has improved, but is still below expectations.

Some manufacturers report backlogs sufficient to keep plants in present operation throughout the year. Production is up to about 60 per cent with some plants approaching capacity.

Machinery Market Continues Spotty in Mid-West

CHICAGO—As has been the case in this district for a number of weeks, some sellers are more optimistic than others. March was almost a dead loss to some sellers, whereas to others it represented an increase over February and compared favorably with the relatively good business of January. Small tool activity in one office increased during March about 12½ per cent. Machine tools, upon which quotations have been made, remain in large number, but April does not offer any particularly encouraging prospects.

Foreign Buying for Auto Production Expected at Detroit

DETROIT—There is evidence that foreign buyers will become active in this area soon, one group having already initiated inquiries for large quantities of equipment for an automobile plant. Russian representatives of Autostroy have become exceedingly busy in this area, having already inquired for a variety of equipment for processing of bores, gears and other parts, and also having inquired for inspection equipment in large volume. A current gathering of Ford machinery men in England is privately reported to be concerned with tooling up for production of an aircraft engine, either in England or in France. American equipment manufacturers anticipate getting the call to take part in this program when it develops.

The Norge refrigerator production equipment program, ostensibly ended, is due for a continuation on a moderate scale as the plant is interested in some additional equipment to fill out so-called bottlenecks in production, to the extent of \$30,000 or \$40,000 at least. In addition, reception of the product is reported

very good, so it is conceivable that attempts to increase production will be made by adding more equipment. Murray Corp. of America is definitely making plans to get into production within a few weeks on the body for the new Crosley car, now nearing the public-announcement stage. This activity promises little in the way of new equipment, although it is evident that some money will be spent in preparing for production. Meanwhile, the Pontiac purchases for transmission manufacture continue to be a factor.

Month's Sales Start Off Slowly in Cleveland

CLEVELAND—The month has started off a little slower than March for dealers in this district. Producers, however, continue active against previous orders and in some cases deliveries are becoming extended. Chevrolet at Toledo

Machine Tool Dealer Defined Under Public Contracts Act

WASHINGTON—At the request of the Associated Machine Tool Dealers of America, the Secretary of Labor on April 5 approved an interpretation of machine tool dealers to permit them to qualify for government contracts under the terms of the Public Contracts (Walsh-Healey) Act even though they have no warehouse facilities or do not otherwise stock their products.

Breaking down its definition of "regular dealer" into four sub-heads for dealers in various commodities, the Secretary approved this clause with respect to machine tool dealers as an amendment to Article 101(b) of Part II of the regulations No. 504, dated Sept. 14, 1936:

"(3) A machine tool dealer may be a person possessing, through contract or agreement with a manufacturer, the responsibility for selling that manufacturer's products, with respect to a specific territory and who is authorized by such manufacturer to offer its products and to negotiate and conclude contracts for the furnishing thereof; provided, that upon all orders to manufacturers for direct shipment to the United States he agrees to insert a notice to the manufacturer to the effect that the supplies are purchased for the United States and that the manufacturer is within the terms of Article

is actively in the market for drilling and broaching equipment. Sales during the past week included a number of lathes and special purpose machines. A local tractor manufacturer has purchased considerable used machinery.

April Orders Start Off Spotty in the East

NEW YORK—While for some sellers the first week in April saw no diminution in the selling pace set up in March, for others the period was a complete blank. Quotations are still being actively made, however, and unless international conditions disturb domestic confidence considerably, April volume should compare favorably with that of March, which was the most active month in over a year. While a great deal of buying is still being done by firms with Government contracts, somewhat broader sources are now being tapped. A railroad equipment builder entered the market last week on the strength of a recently placed contract for 15 locomotives. The Navy and Maritime Commission programs are causing the two leading electrical equipment manufacturers to purchase large equipment for their turbine and generator departments.

104 of these Regulations requiring compliance with the provisions of the 'Public Contracts Act'."

... CANADA ...

... New steel bookings have slumped.

TORONTO, April 11—While the Canadian steel industry maintained a steady operating schedule during the first quarter, averaging around 60 per cent, new bookings were more than 25 per cent below those of the first quarter last year. The slump in new orders largely was due to the fact that the Canadian Pacific Railway failed to award contracts for rolling stock, and, with the exception of a small order from the New York Central, no rail contracts were placed. Steel interests, however, have hopes that rail awards and rolling stock contracts from the C.P.R., will be announced later in the year.

The European situation is said to be responsible in large part for the slump in Canadian buying, although it has stimulated sales to Great Britain and British Dominions.

In the pig iron markets demand is sharply off from the opening weeks of the year and the larger melters are showing little interest. Only a small number of melters have covered for second quarter.